BROOKLYN BOTANIC GARDEN

RECORD

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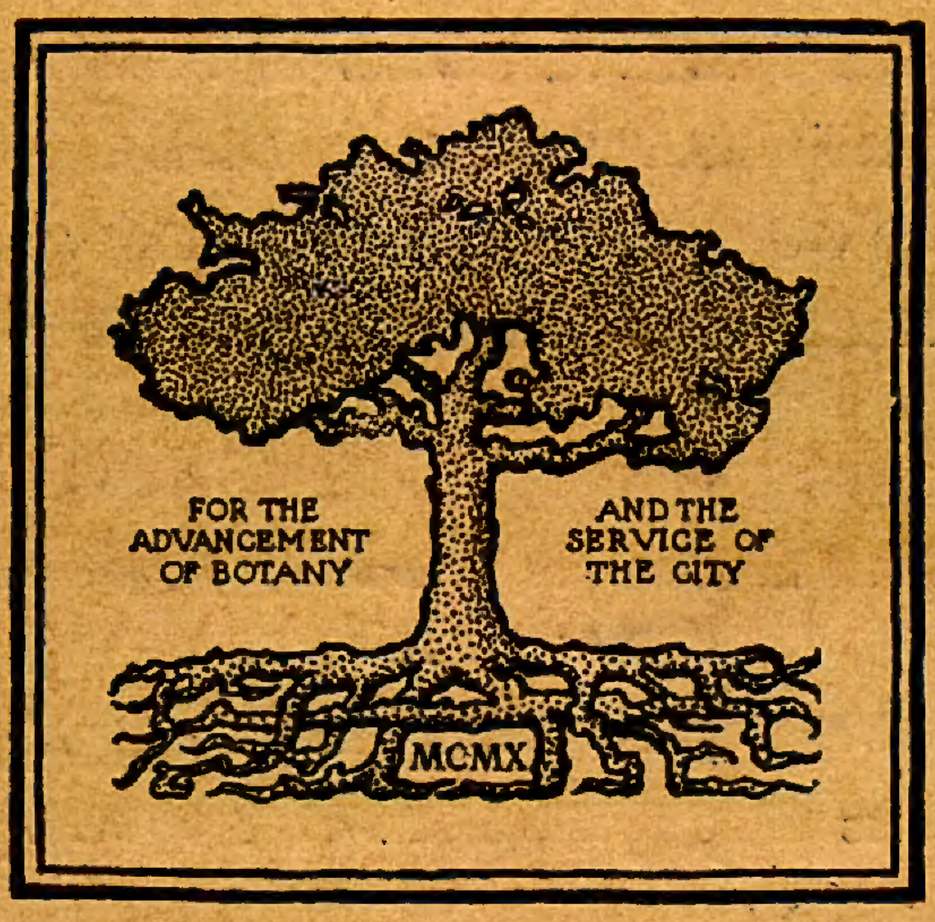
C. STUART GAGER



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THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN RECORD

VOL. X January, 1921 No. 1

PROSPECTUS, 1921

COOPERATION WITH LOCAL SCHOOLS

1. Talks at Schools.—The principals of public or private schools may arrange to have lantern talks given at the schools on various topics related to nature study, such as garden work with children, tree planting, and Arbor Day. If an illustrated lecture is desired, the lantern and operator must be provided by the school, but slides will be furnished by the Botanic Garden. Address the Curator of Elementary Instruction for list of talks and for appointments.

2. School Classes at the Garden.—(*a*) Schools not provided with a stereopticon may arrange for classes, accompanied by their teachers, to come to the Botanic Garden, for lectures either by the teacher, or by a member of the Garden Staff.

(*b*) Notice of such a visit should be sent at least *one week* previous to the date on which a talk is desired. These talks will be illustrated by lantern slides, and by the conservatory collection of useful plants from the tropics and subtropics. Spring and fall announcements of topics will be issued during 1921.

(*c*) The Garden equipment, including greenhouse, plant material, lecture room, lantern, and slides is at the disposal of teachers who desire to instruct their own classes at the Garden. Arrangements must be made in advance with the Curator of Elementary Instruction, so that such work will not conflict with other classes and lectures.

(*d*) The principal of any secondary or high school in Brooklyn may arrange also for a series of six lessons on plant culture to be given during the fall or spring to a class. These lessons will be worked out for the most part in the greenhouse. Such a course must be arranged for in advance, and the class must be accompanied by its teacher. Adapted for pupils above the fourth grade.

3. Home Gardening.—Assistance will be given to children in planning and planting home gardens. Enrollment cards for such assistance may be had on application to the Curator of Elementary Instruction. Prizes will be offered to both schools and individuals, at the annual Children's Garden Exhibit, for the best results in home gardening. This exhibit is open to all children in the city of Brooklyn, although their garden products may have been raised at their summer homes. *Certifications must be made that the work has been done by the child himself.*

The exhibit for 1921 will be held on *Friday* and *Saturday, September 23* and *24*. All exhibits, of schools as well as of individuals, must be brought to the Brooklyn Botanic Garden before 3 o'clock *Thursday* afternoon, *September 22*. The exhibit will be judged at 4 o'clock on that afternoon, and will be open for public schools all day Friday, when classes are invited to come with their teachers. The exhibit will be open to the general public on Friday and Saturday from 10 to 4. After 4 o'clock on Saturday afternoon the exhibitors may remove their exhibits. Prizes will be presented on Saturday afternoon, *October 8*, at 2:30 o'clock.

Gold and bronze medals will be awarded as first and second prizes for individual exhibits. A trophy is the first prize for the school making the best exhibit as a whole. A bronze statue is another trophy given for the best school box display. Each trophy is to be competed for annually until one school wins it three times, when it will become the property of that school. A new prize will then be offered.

4. Penny Packets of Seeds.—In order to assist the above work, penny packets of seeds are put up by the Botanic Garden, for children's use. In the early spring, lists of these seeds, conditions for entry as an exhibitor, home gardening record cards, and other information may be had on application to the Curator of Elementary Instruction.

5. Conferences.—Conferences may be arranged by teachers and principals for the discussion of problems in connection with gardening and nature-study. Appointments must be made in advance. Address Miss Ellen Eddy Shaw.

6. Study and Loan Material.—On request, the Garden will endeavor to provide living seedlings or plant parts for study, to the extent of our facilities. Teachers may arrange to have various physiological experiments or demonstrations conducted at the Garden. Petri dishes, which must be cleaned and delivered to the Garden, will, on request, be filled with nutrient agar, ready for exposure in the study of bacteria and molds. In all cases arrangements must be made by teachers for calling for such material, and all material loaned by the Garden must be returned promptly in good condition.

During the fall and spring the Botanic Garden will be able to arrange for a limited number of loan exhibits to public schools of living and herbarium material of spring wild flowers and weeds, and of fall wild flowers and weeds. Applications should be sent in a week before the exhibit is desired to Ellen Eddy Shaw.

COURSES OF INSTRUCTION

A. Children's Gardens and Nature Study

Courses for Children

A1. The Beginners' Garden.—Open annually to 50 boys and girls who have never had instruction in gardening at the Brooklyn Botanic Garden. This course takes up the small garden, what to plant, how to plant it, care, replanting, etc. *Application for plots should be made in person or in writing before March 1st.* Size of plots 8 ft. by 10 ft. All crops belong to the individual. *Fee, twenty-five cents. Saturday* mornings 9–11, *April 2 to October 22.* Miss Shaw, Miss Blank.

A2. Second Year Gardens.—Open to boys and girls who have had one or more seasons at the Brooklyn Botanic Garden—a continuation of course A1. Open to 75 boys and girls. Registration should be made before September 1st of each year for the fol-

lowing year. *Fee, twenty-five cents.* *Saturday* mornings 9–11. *April 2 to October 22.* Miss Shaw, Miss Burtis.

A3. Junior Garden Assistants.—Open to older boys and girls, or to those who have mastered Courses A1 and A2. Size of plot 10 ft. by 20 ft. *Fee, fifty cents.* These gardens are for the raising of vegetables. The work is stated as a problem: "How much can one raise on a plot 10 ft. by 20 ft.?" Hours to be arranged. The student must put in at least two periods a week during the summer vacation, and if possible, three. Registration date: *April 2.* Miss Shaw, Miss Elmer.

A4. Preparation for the Outdoor Garden.—The following classes are open to boys and girls during the spring of each year. The courses are planned for a better understanding of plant life and so that the outdoor garden may become a more intelligent piece of work. Classes are limited to fifteen. The *fee* for each course is *fifteen cents* to cover the cost of material.

Boys' Spring Course.—(*a*) *Saturday* mornings 9:15–10, *February 5 to March 12.* (*b*) *Saturday* mornings 10:15–11, *February 5 to March 12.*

Girls' Spring Course.—(*a*) *Saturday* mornings 9:15–10, *February 5 to March 12.* (*b*) *Saturday* mornings 10:15–11, *February 5 to March 12.* Miss Blank, Miss Burtis.

A5. Advanced Work for Older Boys and Girls.—How to raise plants, mix soils, transplant, start seedlings for outdoor gardens, etc. Boys and girls who have taken spring courses under A4 are eligible for advanced work. This work will be of silver pin standard. The *fee* for the course is *twenty cents.* Each student may take home his plants and seedlings. This course is open to both boys and girls over twelve years of age. *Saturday* mornings at 9:15. *February 5 to March 12.* Miss Shaw, Miss Elmer.

A6. Advanced Nature Work.—A course designed for those older boys and girls who have taken courses A1–A5. Plant collections will be made, and the simpler principles of classification studied. Special problems will be assigned to individuals, and larger garden plots will be set aside for the further working out of these problems. *Open only to pupil assistants of the Garden who are working for their silver pins. Hours to be arranged.*
Miss Shaw, Miss Elmer.

A7. Fall Greenhouse Work.—The following courses are self-explanatory and are for both beginners and advanced students:

Class A.—Open to boys and girls who have been in at least two fall bulb classes before this. This class is for advanced work. The bulbs used will be: Hyacinth, tulip, narcissus, oxalis. Geranium cuttings and primroses will also be used. Time of class, 9:15, *Saturday* mornings. *Fee, fifteen cents. November 5 to December 10.* Miss Blank.

Class B.—Open to boys and girls who have never taken any greenhouse work before. Bulbs used: Narcissus, oxalis, primrose; also geranium cuttings. *Saturday* mornings at 9:15. *Fee, fifteen cents. November 5 to December 10.*

Miss Blank, Miss Burtis.

Class C.—Open to boys and girls over thirteen years of age. Work is of silver button standard. Subjects studied: Hyacinth, Easter lily, calla lily, the botany of common cultivated plants, etc. *Fee, twenty-five cents. Saturday* mornings at 9:15. *November 5 to December 10.* Miss Shaw.

Class D.—Subject: basketry. Open to boys and girls 11 years old and over. *Saturday* mornings at 10:15. *Fee, twenty-five cents. November 5 to December 10.* Miss Blank.

Class E.—Open to any boy or girl. Subject: the making of garden Christmas presents. There will be a choice of gifts. Some of the articles made will be the following: a basket, seed packet, flower book-mark, painted pot and plant to go in it, calendar, pot of sweet peas, wooden box with flower design, one article made in the wood-work shop. *Saturday* mornings at 10:15. *Fee, twenty-five cents. November 5 to December 10.*

Miss Burtis.

A8. Junior Gardeners' Course.—A course for boys 14–17 years of age. Lessons given in the care of border and other flower beds, in the weeding and care of small vegetable gardens, in mowing and watering lawns, repotting plants, etc. This is planned to fit boys for summer work, and to enable them to obtain positions. Hours to be arranged. *Fee, fifty cents.* Practical work with the gardeners and foreman, under the supervision of Miss Shaw.

A9. Nature Study for Boy Scouts, Girl Scouts, Camp Fire Girls, Scout Leaders, and Others.—Short courses of at least four hours each, with talks, demonstrations, and field trips in the Botanic Garden and Prospect Park to study trees, shrubs, etc. The instruction will be adapted to meet the needs of the various groups who apply. *Open only to groups of at least ten persons.* Hours to be arranged. Mr. Stoll.

A10. Special Work for High School Pupils.—A course in gardening or greenhouse work adapted for high school pupils. Classes to be arranged for by the high school teacher.

Miss Shaw.

Courses for Teachers

A21. Greenhouse Work for Teachers.—Do you wish to learn how to raise plants for the school garden or your own garden? This course is a practical one and almost the entire work is done in the greenhouses. All of the seedlings raised belong to the student. *Open to beginners only.* Students who have taken this course but who wish to continue this work, although not admitted to the class, may arrange for an assignment of space in the greenhouse. *A fee of one dollar* will be charged to cover cost of materials. *Monday* afternoons at 4. *February 14 to March 21.* Miss Shaw.

A22. The School Garden.—A series of four practical lessons and demonstrations on the school garden; how to lay it off, plant it, kinds of seeds to use, school garden management, etc. *Fee, fifty cents* to cover cost of materials. *Monday* afternoons at 4, *April 4 to 25.* Miss Shaw.

A23. Spring Nature Study for the Class Room.—This course of four lessons will acquaint the teacher with common nature study material which may be taken into the classroom during the springtime. Demonstration materials will be given to members of this class. The work will be based on the syllabus of nature study for the schools of New York City, and will be entirely practical. *No fee will be charged* for this course. *Monday* afternoons at 4 o'clock, beginning *May 9.* Miss Shaw.

A24. Fall Garden Work.—Home plants; the school window box; indoor planting of bulbs; the outdoor bulb bed. *A fee of*

one dollar will be charged to cover cost of materials. Four *Monday* afternoons at 4, *October 10 to 31.* Miss Shaw.

A25. Fall Nature Study.—This course is a complement to the spring nature study work and the material used will be the common material one would use in class room work—seed dispersal, evergreens, deciduous trees, etc. Such subjects as Nature's preparation for winter will be covered. Three lessons. *Monday* afternoons at 4, *September 19 to October 3.* Miss Shaw.

B. Courses for Teachers of Children's Gardening

The course for teachers in children's garden work is planned not only to prepare for garden work, but for the teaching of nature study as well. Our courses are so arranged that they emphasize not only the theory of each subject, but its actual practice, either in classroom, greenhouse, garden, or field. At the same time the work is correlated to meet the needs of each grade of the elementary school. There is an increasing demand for good nature study work in our schools, and we make a special point of giving simple, definite, helpful work, grading it so that it applies directly to the immediate needs of our own city schools. Practice is given in all this work with classes of children of different ages. The requirements for entrance are a certificate from a city training or normal school, a college diploma, or several years of certified successful teaching. These courses may be completed during one year, or, as in the case of city school teachers, may extend over a period of two or more years. The *fee for the entire course is twenty-five dollars,* payable in full at the time of registration, or course by course as they are covered. No money will be refunded if the student drops the work, and no monetary allowances will be made for courses taken at other institutions, although time allowances will be made.

Special stress is put upon the outdoor garden practice. This practice is of two kinds: (1) Practice with children. There are two hundred children in our outdoor garden and every opportunity is given for the student to become accustomed to handling children, and for working out problems connected with this phase of work. (2) Practice in the teacher's garden. Each student has

a garden of her own and works it herself, thus performing all gardening operations to be taught later to children.

To those who satisfactorily complete this course a certificate will be given. *The courses offered in children's gardening are considered as a unit.*

These courses have been accepted by the Board of Education for teachers' credits as follows:

1. Any of the courses will be accepted toward meeting clause "b" of the conditions of eligibility for high school license in Biology.

2. The course in Pedagogy of Botany and Educational Principles of Children's Gardening (B4) will be accepted as a satisfactory 30-hour course in Pedagogy toward meeting the requirement of 60 hours' work in Pedagogy in lieu of the written test in Principles and Methods of Teaching for Promotion License.

3. This course will be accepted as a pedagogical course, and either of the other four courses will be accepted as an academic course toward meeting the conditions of exemption from the academic paper in the examination for license as assistant to principal. Such exemption is granted to those who offer 120 hours of satisfactory work, 60 of which must be in the Science of Education and 60 in some branch of literature, science or art, such 120 hours' work not being accomplished wholly within one academic year.

These courses have been accepted by the Brooklyn Teachers' Association and will appear in the new syllabus of courses.

The individual student may apply at any college for credits on these courses, which will be granted according to individual merit.

B1. Botany.—Thirty sessions, *Mondays* at 4, beginning *September 26. Fee $5.* Physiological and morphological principles, general botany, plant families, fungous pests. This course is not only one of theory and principle, but one of practical everyday application. The Curator of Public Instruction.

B2. Nature Study.—Thirty sessions, *Tuesdays* at 4, beginning *September 27. Fee $5.* This course covers the plant material used in nature study teaching. The identification of common trees, shrubs, plants, wild flowers, and weeds. Mounts, charts, and diagrams are made. The student becomes familiar with the

actual material. This course is entirely a practical one. The work is done in field and laboratory. Laboratory and field work has double time, or two hours for a one-hour count.

Miss Shaw and Mr. Stoll.

B3. Principles of Agriculture and Horticulture.—Thirty sessions, *Wednesdays* at 4, beginning *September 28. Fee $5.* This course will be specially helpful to teachers. The principles of horticulture are considered and practically applied through greenhouse, laboratory, and lecture work. All laboratory work is given double time. The greenhouse work includes the subject of plant propagation, and the student does his work of investigation with bulbs, roots, rhizomes, seeds, etc. The care of the greenhouse, home plants and window box materials is taken up. The subjects of soils, fertilizers, hotbeds, home plants and window box materials is taken up. The subjects of soils, fertilizers, hotbeds, cold frames, tools and implements, and cropping, seed sowing, cultivating, insect and fungous pests, grafting, and pruning are all practically and theoretically covered. Problems of heredity, variation and environment, and their bearing on education, illustrated by demonstration material obtained from plant-breeding experiments and by lantern slides. Lecture subjects: Kinds and extent of variation in plants and animals; how characters are inherited; sex in plants and the methods of crossing; human heredity.

Dr. White, Miss Shaw, and Mr. Free.

B4. Pedagogy of Botany and Educational Principles of Children's Gardening and Nature Study.—Thirty sessions, *Thursdays* at 4, beginning *September 29. Fee $5.* Discussion of the mental processes involved in learning and teaching science, and the fundamental principles which underlie and point the way to laboratory and field work. After this a course of study in gardening and nature study based on the school syllabus is worked out and the basic psychological and pedagogical principles discussed. This course includes all the modern phases of the subject and is so arranged that it may be taken directly into classroom work. Gardening as a factor in civic education is a key note.

Dr. Gager and Miss Shaw.

B5. Garden Practice.—Thirty sessions, beginning *Friday, September 30,* at 4 p. m. *Fee $5.* This course is entirely practical

and includes laboratory and all the outdoor work of the student in his own garden, applying the principles of agriculture and gardening and also work with children in the garden. Three hours of practice counts as one credit hour. Practice may be taken Saturday mornings in May and June, or in hours arranged. Ninety hours is the minimum in this course, but students may profitably put in a greater number of hours to the maximum of 630 hours, or seven college credits. Miss Shaw.

C. Courses for the General Public

Courses C1–C9 are *free to members of the Botanic Garden.* They are free to the general public except where otherwise specified. Those planning to take any of this work are asked to register at the Garden at least one week before the course opens, so that adequate arrangements may be made for materials, etc. They are open to both men and women, but no course will be given to a class of less than six.

C1. Plants in the Home. How to Grow Them.—Five talks with demonstrations. Practice in potting, mixing soils, making cuttings, etc. This course deals with the principles to be followed in raising plants. The members of the class have the privilege of keeping the plants raised by them. *A fee of one dollar* will be charged. *Thursday* afternoons, at 4 o'clock, *February 3 to March 3.* Mr. Free.

C2. Planning the Garden.—Four lessons. Arrangement of flowers to secure continuous bloom, color schemes, planting of trees, shrubs and plants to best advantage, cropping plans to provide a succession of vegetables throughout the year. *Thursdays* at 4 o'clock, *March 10 to 31. No fee.* Mr. Free.

C3. The Flower Garden.—Making the most of it. How to improve soils, and get results from planting; old-fashioned flowers; annuals; summer bedding; vines for screening unsightly objects, rose and shrub growing, pruning, making a lawn and keeping it up. Five lectures. *Fee, one dollar. Thursdays* at 4, *April 7 to May 5.* Mr. Free.

C4. Gardening in the Fall.—Six lessons showing how to make cuttings, plant bulbs, care for tender plants, how and what to

grow. *Fee, one dollar. Thursday afternoon* from 4 to 5, *September 29 to November 3.* Mr. Free.

C7. Plant Families. Early Spring course.—Five lectures on the main groups and important families of the higher plants, illustrated by numerous specimens and lantern slides. (1) The history of plant classification. (2) From clubmosses to conifers. (3 and 4) The dicotyledons. (5) The monocotyledons. *Fridays* at 4, *March 4 to April 1.* Dr. Gunderson.

C8. Plant Families. Late Spring course.—Five outdoor lessons on spring flowers and ferns, emphasizing family characters. *Fridays* at 4, *May 20 to June 17.* Dr. Gunderson.

C9. Bacteria and Other Micro-organisms in the Home.—Eight periods devoted to lectures and demonstrations on the occurrence of bacteria, yeasts, molds, and other micro-organisms in the home; in water and sewage; the principles underlying the canning of foods, etc. Not offered in 1921.

Public Lectures

Fridays at 4, April 8–29.

April 8. *The Flower Garden; Its Plan and Arrangement.* Miss Grace Tabor, Landscape Architect, New York City.

April 15. *The Meaning of a Flower.* Prof. S. C. Schmucker, State Normal School, West Chester, Pa.

April 22. *Flower Arrangement.* Mr. B. F. Letson, Boston, Mass.

April 29. *Common Garden Flowers; How they may be improved.* Dr. Orland E. White, Curator of Plant Breeding, Brooklyn Botanic Garden.

D. Course for the Training of Gardeners

The following course for the training of gardeners is planned to meet the needs of students of the Federal Board for Vocational Education, but is open to all who meet the necessary requirements.

Requirements:

Age.—At least 18.

Personality.—To be satisfactory to Botanic Garden authorities.

Education.—Schooling through at least the first two years of

high school, or its equivalent in experience and general intelligence, to be decided by personal conference.

Enrollment.—Students may, for the present, enter the course at any time.

Continuation.—Students who give evidence that they are not likely to succeed in gardening will not be allowed to continue the course.

Vacations.—Four weeks distributed throughout the year.

First Year

First Quarter

1. Garden and Greenhouse Practice.—Five days a week; hours 9–12; 1–2:30.

Care of tools, care of cold frames, making a hotbed, seed sowing, transplanting, lawn making, hoeing and cultivating, spraying for insect and fungous pests, watering, winter protection of plants, manuring, harvesting and storing, staking and tying, supports for climbing plants, pruning, and repair of trees, propagation by seeds, cuttings, layers, budding and grafting; care of rock garden, perennial garden, bedding plants, aquatic garden, wild garden; making up window boxes and hanging baskets; transplanting trees and shrubs, etc.

Greenhouse.—Watering, ventilating, shading, cleaning plants of insect pests, potting, heating, practice with special crops, orchids (planting and general care); chrysanthemums (potting and general care); ferns, palms, *Primula, Cyclamen,* etc.

2a. Elementary Botany.—Plant structure and function. Twice a week.

3. Soils and Fertilizers.—Once a week.

4. Inspection of the Plantations and Plant Houses Under Guidance.—Study of plant materials. Once a week.

5. Special Lectures and Conferences.—Saturdays.

6. Assigned Readings and Reports.—Once a week.

Second Quarter.

1. Garden and Greenhouse Practice (continued).

2a. Elementary Botany.—Plant structure and function (continued). Once a week.

4. Inspection of the Plantations and Plant Houses Under Guidance (continued).—Once a week.

5. Special Lectures and Conferences.—Saturdays.

6. Assigned Readings and Reports.—Once a week.

7a. Animal Friends and Foes in the Garden.—Once a week.

8a. Fungous Diseases of Plants.—Once a week.

Third Quarter.

1. Garden and Greenhouse Practice (continued).

2b. Elementary Botany.—Classification, identification of plants. Once a week.

4. Inspection of the Plantations and Plant Houses Under Guidance (continued).—Once a week.

5. Special Lectures and Conferences.—Saturdays.

6. Assigned Readings and Reports.—Once a week.

9. Principles of Horticulture.—Once a week.

10. Trips to Nurseries, Private Places and Other Gardens Under Guidance.—Once a month.

11. Plant Relations.—Once a week for six weeks.

Fourth Quarter.

1. Garden and Greenhouse Practice (continued).

2b. Elementary Botany.—Classification, identification of plants (continued). Once a week.

4. Inspection of the Plantations and Plant Houses Under Guidance (continued).—Once a week.

5. Special Lectures and Conferences.—Saturdays.

6. Assigned Readings and Reports.—Once a week.

9. Principles of Horticulture.—Once a week.

10. Trips to Nurseries, Private Places and Other Gardens Under Guidance.—Once a month.

12. Garden Carpentry.—Once a week.

Second Year

First Quarter.

1. Garden and Greenhouse Practice (continued).

4. Inspection of the Plantations and Plant Houses Under Guidance (continued).—Once a month.

5. **Special Lectures and Conferences.**—Saturdays.

6. **Assigned Readings and Reports.**—Once a week.

10. **Trips to Horticultural Exhibits, Nurseries, Private Places and Other Gardens Under Guidance.**—Once a month.

13. **Garden Planning.**—Once a week.

14. **Floriculture.**—Once a week.

15. **Vegetable Growing.**—Once a week.

16. **Floral Decoration.**—Once a month.

Second Quarter.

1. **Garden and Greenhouse Practice** (continued).

4. **Inspection of the Plantations and Plant Houses Under Guidance** (continued).—Once a month.

5. **Special Lectures and Conferences.**—Saturdays.

6. **Assigned Readings and Reports.**—Once a week.

8b. **Funguous Diseases of Plants.**—Advanced course. Once a week for six weeks.

10. **Trips to Horticultural Exhibits, Nurseries, Private Places and Other Gardens Under Guidance.**—Once a month.

14. **Floriculture** (continued).—Once a week.

15. **Vegetable Growing** (continued).—Once a week.

16. **Floral Decoration.**—Once a month.

17. **Plant Breeding.**—Once a week for six weeks.

Third Quarter.

1. **Garden and Greenhouse Practice** (continued).

4. **Inspection of the Plantations and Plant Houses Under Guidance** (continued).—Once a month.

5. **Special Lectures and Conferences.**—Saturdays.

6. **Assigned Readings and Reports.**—Once a week.

7b. **Animal Friends and Foes in the Garden.**—Advanced course. Once a week for six weeks.

10. **Trips to Horticultural Exhibits, Nurseries, Private Places and Other Gardens Under Guidance.**—Once a month.

14. **Floriculture** (continued).—Once a week.

16. **Floral Decoration.**—Once a month.

18. Types of Gardens.—Once a week.

19. Road and Walk Making; Use of Cement in Garden Structures.

Fourth Quarter.

1. Garden and Greenhouse Practice (continued).

4. Inspection of the Plantations and Plant Houses Under Guidance (continued).—Once a month.

5. Special Lectures and Conferences.—Saturdays.

6. Assigned Readings and Reports.—Once a week.

10. Trips to Horticultural Exhibits, Nurseries, Private Places and Other Gardens Under Guidance.—Once a month.

16. Floral Decoration (continued).—Once a month.

20. Window Boxes, Hanging Baskets, Wardian Cases, etc.—Once a week for six weeks.

21. Greenhouse Construction.—Once a week for six weeks.

22. Plant Forcing.—Once a week.

Principles of Pruning.—Once a week for six weeks.

For final certification one year's satisfactory experience will be required, under direction, in an accepted commercial or private garden.

E. Advanced Courses and Investigation

For the following advanced and research courses there is a charge covering all expenses, including laboratory fee, of *$30 for each full course* of 100 credit hours, and *$20 for each half course* of 50 credit hours.

Advanced Courses

E1. Mycology and Plant Pathology.—Morphology and pathology of the fungi and bacteria. Life histories of fungi; methods of control of plant diseases, etc. Prerequisite, a satisfactory college course in general botany. 100 credit hours of work. Hours to be arranged. Curator and assistant.

E2. Experimental Evolution.—Detailed studies of the nature and causes of variation and heredity. Some of the subjects considered are: Historical Résumé of the Evolution Theory, Physical Basis of Inheritance, Inheritance of Acquired Characters, Kinds

and Causes of Variation, Mendelism, Biometry, Principles and Technique of Plant Breeding. This course is open to students of college rank with a knowledge of the elements of physics, chemistry, geology, botany, and zoology. The work is primarily intended for students in pure science, and for agricultural or horticultural students fitting themselves for various professional activities in these particular fields. Three lectures and two laboratory periods a week. 100 credit hours of work. Hours to be arranged. Dr. White.

E3. Phytogeography.—A course dealing with plant distribution over the earth. Prerequisites are courses in plant ecology and geology, and a good general knowledge of climatology and systematic botany. 50 credit hours of work. Hours to be arranged. Mr. Taylor.

E4. Systematic Botany.—Collecting, identifying and classifying the higher plants. Studies in the outdoor collections, the conservatories, and the herbarium. Hours to be arranged.
Dr. Gunderson.

E5. Seminar and Journal Club.—Irregular meetings of the Garden Staff and advanced students, for the discussion of fundamental problems of botany or of general biology, and for the review of current botanical literature. Open to others on invitation.

*Graduate Study and Botanical Research**

E6. Research in Mycology and Plant Pathology.—Independent investigation of problems in fungi and fungous diseases of plants. Dr. Reed.

E7. Research in Plant Genetics.—Independent investigation of problems of variation and heredity, including that phase of cytology having a direct bearing on the subject matter of genetics.
Dr. White.

*Courses of graduate rank offered by the Botanic Garden, when approved by the Faculty of the Graduate School of New York University, are listed as courses in the Graduate School, and are given the same credit as other graduate courses. Properly qualified students who take these courses may present them in satisfaction of the requirements for advanced degrees given by the University. Graduate credit has also been allowed elsewhere for such advanced work done at the Garden.

E8. Research in Plant Geography and Ecology.—Independent investigation of problems in plant geography and ecology.

Mr. Taylor.

OTHER EDUCATIONAL FEATURES

Plantations

The plantations comprise several sections, including the local flora (native wild flower garden), general systematic (trees, shrubs and herbaceous plants not native within 100 miles of Brooklyn), morphological, ecological, economic, and rock gardens, Japanese garden, and children's gardens. As noted below, under *Docentry,* arrangements may be made for viewing the plantations under guidance. They are open free to the public daily from 8 a. m. until dark; on Sundays and holidays at 10 a. m.

Conservatories

The Garden conservatories contain a collection of tender and tropical plants. Of special interest for teachers of nature study and geography is the economic house, containing useful plants from the tropics and subtropics, including the following: banana, orange, lemon, lime, citron, kumquat, tangelo (a cross between the grape-fruit—pomelo—and the tangerine), West Indian cedar (the source of the wood used for cigar boxes), eucalyptus, Manila hemp, sisal, pandanus (source of the fiber used for making certain kinds of fiber hats), fig, grape vines from north and south Africa, date palm, cocoanut palm, chocolate tree, coffee, tea, camphor, ginger, sugar cane, avocado (so-called "alligator pear"), Para and other rubber plants, banyan, religious fig of India, and numerous others.

The conservatories are open daily from 10 a. m. to 4 p. m. In this connection see also below, under *Docentry*.

Herbarium

The Garden herbarium consists at present of over 150,000 specimens, including phanerogams, ferns, mosses, liverworts, lichens, parasitic and other fungi, algæ, and myxomycetes. This

collection may be consulted from 9 a. m. until 5 p. m. by those interested, and specimens submitted will be gladly identified.

Library

The rapidly growing library of the Garden comprises at present over 6,500 volumes and over 8,775 pamphlets. This is not a circulating library, but is open free for consultation to all persons, from 9 a. m. until 5 p. m. Over 400 periodical publications devoted to botany and closely related subjects are regularly received.

Docentry

Classes and other parties of several persons, wishing to view the conservatories and plantations under guidance, may arrange with the Curator of Public Instruction for appointments with a docent to conduct them through the Garden. For this service there is charge of 25 cents an hour or fraction thereof, or 10 cents a person for parties of three or more; except that *no charge* is *made for teachers with classes, nor to members of the Botanical Garden.*

A CURATORSHIP OF PLANT PATHOLOGY

In the *Ninth Annual Report* of the Brooklyn Botanic Garden attention was called to the need in this country of additional provision for fundamental research in plant diseases, and to the desirability of the establishment at the Botanic Garden of a Laboratory or Institute of Plant Pathology. An annual income of $50,000 was stated as necessary properly to initiate such an institute. An endowment sufficient to provide this income has not yet been secured, but the plan has commended itself to some of the Botanic Garden Governing Committee and other friends of the Garden, and a fund of Fifty Thousand Dollars has been subscribed to become available over a period of four years from January 1, 1921. A curatorship of plant pathology has been established, and provision will be made early in 1921 for an experimental greenhouse and grounds.

Dr. George Matthew Reed, of the Office of Cereal Investiga-

tions, Bureau of Plant Industry, of the U. S. Department of Agriculture, Washington, D. C., has been appointed to the new curatorship, beginning with January 1, 1921. Dr. Reed graduated from Geneva College, Beaver Falls, Pa., in 1900, with the degree of A.B., and later from the University of Wisconsin, with the degrees of A.M. (1904) and Ph.D. (1907). He was professor of natural science at Amity College from 1900 to 1903, assistant in botany at the University of Wisconsin 1904–07, instructor 1907, assistant professor of botany, University of Missouri, 1907–1912, and professor 1912–18. Since 1919 he has been pathologist in the Office of Cereal Investigations, U. S. Department of Agriculture. He is a member of the American Association for the Advancement of Science, the Botanical Society of America, the American Phytopathological Society, the Botanical Society of Washington, St. Louis Academy of Science and the Wisconsin Academy of Science, Arts and Letters, and is the author of numerous papers on plant diseases, especially of cereals.

As research fellow, Dr. Reed was in residence at the Brooklyn Botanic Garden from June 15 to September 15, 1916, and again from April 1 to September 12, 1917, during sabbatical leave of absence from the University of Missouri. During these periods of residence, a thorough study was made of the diseases of the trees of Prospect Park and the Botanic Garden, and the results of these studies are embodied in two reports, published in the Brooklyn Botanic Garden RECORD for January, 1917, and January, 1918. Also as a result of this work, the cryptogamic herbarium of the Botanic Garden was enriched with collections of fungi that cause tree diseases. In addition to his research work, Dr. Reed will also act as curator of the cryptogamic herbarium, and will have general oversight for plant diseases, of our collections of living plants in conservatories and plantations.

NOTES

Presentation of Certificates.—Certificates for teachers of chilren's gardening were presented to the 1920 class at the Botanic Garden on Saturday afternoon, November 20. This is the sev-

enth class to receive certificates. The exercises were held at three o'clock. Dr. Gager presided, and Dr. Jean Broadhurst, of Teachers' College, Columbia University, gave the address on the subject, "Nature Study of Today." After the address, Miss Adele Quitman, of the 1920 class, presented a brass tea-tray to the Garden as a parting gift from the class. Everett Steeves, a member of the Boys' Club of the Botanic Garden, then presented a large brass bowl as a gift to the children's new room. The gifts were received by Mr. White, Chairman of the Botanic Garden Governing Committee. After the presentation of certificates, tea was served in the rotunda of the Laboratory Building.

Visitors to the Botanic Garden since the preceding issue of the Record include Dr. Kakugoro Nakata, Tukroka, Prof. and Mrs. Takashi Matsumoto, of Monaka, Japan (October 4), Prof. Yoshinari Kuwada, Imperial University of Kyoto, Dr. Eikichi Iso, Formosa (October 7), Prof. E. M. East, Harvary University (October 13), Prof. Matao Yukawa, Tokio Imperial University, Prof. Eiryo Suzuki, Tokio Silvicultural College, Prof. Takehiro Suzuki, Kyoto Silvicultural College, Prof. Kozo Suzuki, Live-Stock Institue of Japan (October 20), Mr. William W. Diehl, U. S. Department of Agriculture, Dr. Henry C. Henricksen, Porto Rico Agricultural Experiment Station (November 15), and Dean W. L. Bray, Syracuse University (November 26).

National Research Council.—A site for the new building in Washington which is to serve as a home for the National Academy of Sciences and the National Research Council, has recently been obtained. It comprises the entire block bounded by B and C Streets and Twenty-first and Twenty-second Streets, Northwest, and faces the Lincoln Memorial in Potomac Park. The Academy and Council have been enabled to secure this admirable site, costing about $200,000, through the generosity of the following friends and supporters: Thomas D. Jones, Harold F. McCormick, Julius Rosenwald, and Charles H. Swift, Chicago; Charles F. Brush, George W. Crile, John L. Severance, and Ambrose Swasey, Cleveland; Edward Dean Adams, Mrs. E. H. Harriman, and the Commonwealth Fund, New York City; George

Eastman and Adolp Lomb, Rochester; E. A. Deeds and Charles F. Kettering, Dayton; Henry Ford, Detroit; Arthur H. Fleming, Pasadena; A. W. Mellon, Pittsburgh; Pierre S. duPont, Wilmington; Raphael Pumpolly, Newport; Mr. and Mrs. H. E. Huntington, Los Angeles; Corning Glass Works, Corning, New York. Funds for the erection of the building have been provided by the Carnegie Corporation of New York.

High School Classes at the Garden.—As a part of the required work in one of the biology courses at the Stuyvesant high school (Brooklyn), Dr. R. C. Benedict has arranged for regular visits to the Botanic Garden. There are about 150 boys electing this course. In groups of 20 to 30 they are met at the Garden by the instructor and are given demonstrations and instruction in the Garden conservatories. The following topics are among those which have been considered:

1. Evolution by mutation, illustrated by sports of varieties of the Boston fern (*Nephrolepis*). One entire house of our conservatories is devoted to these forms, which afford the material for studies in heredity and evolution in definite directions (orthogenesis) by Dr. Benedict, who is a resident investigator at the Garden.

2. Cross-pollination by insects, illustrated chiefly by material in the orchid house.

3. Formation of fossils, using the specimens in the Garden Collection.

4. Carnivorous plants.

5. Varieties and ecology of roots, including air-roots, water-roots, stilt-roots, etc.

6. Adaptation of water plants, using water hyacinth, *Aponogeton,* water ferns, and other forms.

Other topics include plant irritability and response (sensitive plant), and tropical and sub-tropical economic plants, such as sugar cane, banana, coffee, fiber plants, bamboo, vanilla, commercial rubber plants, and others. The pupils are required to hand in written reports of the work.

Tulip Planting.—During November ten thousand tulip bulbs were planted on the west slope of the knoll west of the tropical

lily pool. They are all of the "Gretchen" variety of the Darwin group, and "self-colored," that is, having the color uniformly diffused, and not in stripes or blotches. They are to be grown naturalized, and should make a beautiful sight the latter part of next May.

On December 10, 1920, Mr. Norman Taylor, Curator of Plants and Plantations, was made an honorary member of the American Rose Society.

Mr. Willard G. Bixby, treasurer of the Northern Nut Growers Association, and a member of the Botanic Garden, presented the Garden with twelve named varieties of nut trees for our economic collection, as follows: Ridenhower almond (*Prunus communis*), Busseron, Marquardt, and Green River pecans (*Carya Pecan*), Pleas hybrid Pecan, Kirtland shagbark hickory (*Carya ovata*) Beaver hybrid hickory, Thomas and Stabler black walnuts (*Juglans nigra*), and the Rush and V. Franquette English walnuts (*Juglans regia*). These trees have been planted out on the west border mound, opposite the laboratory building.

On one of the flowering almonds (*Prunus tomentosa endotricha*) in the Prunus triangle a number of flowers were fully opened on December 15—one of numerous plant responses to the unusually warm weather for this date. This shrub is from the collection of E. H. Wilson, in China.

The Brooklyn Institute of Arts and Sciences

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PUBLICATIONS
OF THE
BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the *Annual Report* of the directors and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others one dollar a year; 25 cents a copy.

MEMOIRS. Established, July, 1918. Published irregularly. Volume I, *Dedication Papers:* comprising scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. Price $3.50, plus postage.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

12. *Endemism in the flora of the vicinity of New York.* 10 pages. 1916.

13. *The origin of new varieties of Nephrolepis by orthogenetic saltation. I. Progressive variations.* 28 pages, 6 plates. 1916.

14. *A white-cedar swamp at Merrick, Long Island, and its significance.* 10 pages, 5 plates. 1916.

15. *Present status of the problem of the effect of radium rays on plant life.* 8 pages. 1916.

16. *Flora of the vicinity of New York.* 6 pages, fig. 1. 1917.

17. *Endophyllum-like rusts of Porto Rico.* 9 pages, 3 plates. 1917.

18. *Inheritance of endosperm color in maize.* 11 pages. 1917.

19. *Studies of inheritance in Pisum. II. The present state of knowledge of heredity and variation in peas.* 102 pages. 1917.

20. *Inheritance studies in Pisum. III. The inheritance of height in peas.* 7 pages, fig. 1. 1918.

21. *A sketch of plant classification from Theophrastus to the present.* 16 pages. 1918.

22. *A basis for reconstructing botanical education.* 6 pages. 1919.

23. *Plant families: a plea for an international sequence.* 9 pages. 1920.

24. *Plants and animals of Mount Marcy, New York.* 69 pages, 1 plate, 22 figs. 1920.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

SEED LIST. Issued in December of each year.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in cooperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $6.00 a year.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $3.00 a year.

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BROOKLYN BOTANIC GARDEN RECORD

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TENTH ANNUAL REPORT

OF THE

BROOKLYN BOTANIC GARDEN

1920

FOR THE ADVANCEMENT OF BOTANY AND THE SERVICE OF THE CITY

PUBLISHED QUARTERLY

AT 41 NORTH QUEEN STREET

LANCASTER, PA.

BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

Entered as second-class matter in the Post Office at Lancaster, Pa.

under Act of August 24, 1912.

BOTANIC GARDEN STAFF

DR. C. STUART GAGER, *Director*

MR. NORMAN TAYLOR, *Curator of Plants and Plantations*

DR. O. E. WHITE, *Curator of Plant Breeding*

DR. GEORGE M. REED, *Curator of Plant Pathology*

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MR. FRANK STOLL, *Registrar and Custodian of Buildings*

MR. LOUIS BUHLE, *Photographer*

MR. HERMAN KOLSH, *Foreman*

OBJECTS OF THE BROOKLYN BOTANIC GARDEN

"For the collection and culture of plants, flowers, shrubs and trees, the advancement of botanical science and knowledge, and the prosecution of original researches therein and in kindred subjects; for affording instruction in the same, and for the prosecution and exhibition of ornamental and decorative horticulture and gardening, and for the entertainment, recreation and instruction of the people." *From the Act of May 18, 1897, providing for the establishment of the Brooklyn Botanic Garden. Laws of New York, 1897, Chapter 509.*

THE BOTANIC GARDEN AND THE CITY

The Brooklyn Botanic Garden, established in 1910, is a Department of the Brooklyn Institute of Arts and Sciences. It is supported in part by municipal appropriations, and in part by private funds, including income from endowment, membership dues, and special contributions. Its articulation with the City is through the Department of Parks.

The City owns the land devoted to Garden purposes, builds, lights, and heats the buildings, and keeps them in repair, and includes in its annual tax budget an appropriation for maintenance. One third of the cost of the present buildings was met from private funds.

Appointments to all positions are made by the director of the Garden, with the approval of the Botanic Garden Governing Committee, and all authorized expenditures for maintenance are made in the name of the private organization, from funds advanced by the Institute, which, in turn, is reimbursed from time to time by the City, within the limits, and according to the terms, of the annual appropriation.

By terms of a written *Agreement*, dated August 17, 1914,* between the City of New York and the Institute, touching the Botanic Garden, all plants must be purchased with private funds. In addition to this, it has been the practice of the Garden to purchase all books for the library, all specimens for the herbarium, all lantern slides, and numerous other items, and to pay certain salaries, with private funds.

The needs of the Garden for private funds for all these purposes are more than twice as great as the present income from endowment, membership dues, and special contributions. The director of the Garden will be glad to give full information as to possible uses of such funds to any who may be interested.

* This *Agreement*, published in full in the *Brooklyn Botanic Garden Record*, for April, 1915, amends the agreement of September 9, 1912, which amends the original agreement of September 28, 1909, published in the *Record* for January, 1912.

INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in four main Departments: 1. The Department of Education. 2. The Museums. 3. The Botanic Garden. 4. The Biological Laboratory.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

1. Annual member	$ 10
2. Sustaining member	25
3. Life member	500
4. Permanent member	2,500
5. Donor	10,000
6. Patron	25,000
7. Benefactor	100,000

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to seven carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through cooperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, 6173 Prospect.

PRIVILEGES OF MEMBERSHIP

1. Free admission to the buildings and grounds at all times.
2. Cards of admission for self and friends to all exhibitions and openings preceding the admission of the general public, and to receptions.
3. Services of docent (by appointment), for self and party, when visiting the Garden.
4. Admission to all lectures under Garden auspices, at the Garden or elsewhere.
5. Special lectures and classes for the children of members.
6. Copies of Garden publications, as follows:
   - *a*. Record
   - *b*. Guides
   - *c*. Leaflets
   - *d*. Contributions
   - *e*. American Journal of Botany
   - *f*. Ecology (on request)
7. Privileges of the Library and Herbarium.
8. Expert advice on the choice and care of plants, indoors and out, on planting the home grounds, the care of lawns, and the treatment of plants affected by insects and fungous pests.
9. Identification of botanical specimens.
10. Admission to all field trips, and other scientific meetings under Garden auspices.

FORMS OF BEQUEST TO THE BROOKLYN BOTANIC GARDEN

Form of Bequest for General Purposes

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which said sum to be used for the educational and scientific work of the Brooklyn Botanic Garden.

Form of Bequest for a Curatorship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, as an endowment for a curatorship in the Brooklyn Botanic Garden, the income from which sum is to be used each year towards the payment of the salary of a curator in said Botanic Garden, to be known as the (here may be inserted the name of the donor or other person) curatorship.

Form of Bequest for a Fellowship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which sum is to be used in the payment of a fellowship for advanced botanical investigation in the Brooklyn Botanic Garden, to be known as the.....fellowship.

Form of Bequest for other particular purposes designated by the testator

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, to be used (or the income from which to be used) for the Brooklyn Botanic Garden* .....

.....

* The following additional purposes are suggested for which endowment is needed:

1. The beautifying of the grounds.
2. The purchase of publications for the library.
3. Publishing the results of botanical investigations.
4. Popular botanical publication.
5. The endowment of a lectureship, or a lecture course.
6. Botanical illustration for publications and lectures.
7. The purchase or collection of plants.

TENTH ANNUAL REPORT

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1920

FIG. 1. Art class, from Pratt Institute, in the conservatory plaza, making sketches of the laboratory building preparatory to designing a Botanic Garden poster.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN RECORD

VOL. X April, 1921 No. 2

TENTH ANNUAL REPORT OF THE BROOKLYN BOTANIC GARDEN, 1920

REPORT OF DIRECTOR

TO THE GOVERNING COMMITTEE OF THE BOTANIC GARDEN:

Gentlemen: I have the honor to present herewith the tenth annual report of the Brooklyn Botanic Garden, covering the year 1920, together with a brief résumé of the first ten years of the Garden.

The First Decade

On June 30, 1920, the Brooklyn Botanic Garden completed the first ten years of its active existence. The contract between the City of New York and The Brooklyn Institute of Arts and Sciences for the establishment and maintenance of the Garden was executed by Mayor McClellan on December 28, 1909, just three days before the close of his term of office, but the appointment of a director did not take effect until July 1, 1910. For the first ten months the Garden existed largely on paper, and for the first six months its corporeal existence was represented by one desk and the director, sharing a portion of one room, first in the Academy of Music and later in the Brooklyn Museum. During this period of incubation plans were worked out for the development of the grounds, the construction of the laboratory building and plant houses, and the inauguration of the scientific and educational work for which the Garden was established.

Before the first section of our building was ready for occupancy (September 24, 1913) courses of instruction, under Botanic Garden auspices, were begun by the director on October 15, 1910. The classes met in the science room of the Brooklyn Institute, in the Academy of Music building. This work was continued in the spring of 1911. In the meantime requests from teachers for information, study material, and docentry service began to increase in such a way as to leave no room for doubt that the Botanic Garden was a much needed institution in Brooklyn, and was beginning to meet an important educational want, not otherwise provided for. In November, 1912, a botanical seminar was started for teachers and others for the discussion of questions of botanical science and education, and the response of high-school teachers was very encouraging. These meetings were held in the Brooklyn Museum through the courtesy of the then director, Dr. F. A. Lucas.

On account of grading, initial planting, and other operations, the grounds were closed to the public until May 13, 1911, the 204th anniversary (old style) of the birth of the father of modern systematic botany, Linnaeus.

The first course of instruction offered to adults in the new building was on Indoor Plant Culture, in October, 1913. Forty-six persons registered for the course. During the same month the first high school classes came to the Garden for instruction, and the first grammar school classes in January, 1914. Instruction of children in the new building began in December, 1913. The children's gardens were opened in May, 1914, on the site now occupied by the laboratory building. The first *Prospectus* of lectures, courses of instruction, and other educational opportunities was published in January, 1914. The educational work of the Garden in cooperation with the public schools is, therefore, only seven years old.

Numerical Results. (*a*) *Attendance.*—What are the numerical results of the first ten years? First, the general attendance has increased from about 10,000 in 1911 to 312,000 in 1920, with a peak in 1917 of over 509,000 due to war gardens and other abnormal conditions incident to the war. The grand total for the ten years is over 2,043,800. The total attendance at classes and

lectures has increased from about 200 in 1910–11 to over 53,200 in 1920. With the completion of the first section of our building, in September, 1913, this attendance advanced in one year from 455 to over 10,900; and with the completion of the entire building in April, 1917, the figures jumped in one year from 29,000 (1916) to over 49,400 (1917).

(*b*) *School Classes.*—The attendance of pupils coming in classes from the public and private schools for class instruction and lectures has increased from 544 in 1913 to nearly 23,000 in 1920. Seventy-eight per cent. of the elementary schools of Brooklyn, and 100 per cent. of the high schools, are now using the Garden, as against only about 5 per cent. of all schools when the work was started in 1913. In addition we are also serving schools in Manhattan and Queens, and occasionally those in Richmond (Staten Island) and Bronx boroughs.

TABLE I

NUMERICAL COMPARISONS SHOWING THE GROWTH OF THE BROOKLYN BOTANIC GARDEN DURING ITS FIRST TEN YEARS

The first entry is in the column indicating the year when the activity began.

	1910	1911	1913	1914	1920
1. General attendance		10,000			312,000
2. Attendance at lectures and Garden classes	200				53,200
3. Attendance of school classes			544		23,000
4. Percentage of all schools served			5%		82%
5. Penny packets of seeds distributed.				25,000	128,500
6. Library (books and pamphlets)		728			11,778
7. Herbarium specimens (1912)		1,739			157,000
8. Genera under cultivation		250			1,500
9. Number of monthly payroll	1	5			41
10. Municipal maintenance		$14,550			$68,478
11. Private funds income	$1,314				$34,163
12. Endowment funds	$50,000				$95,525

(*c*) *Collections.*—There were less than 800 books and pamphlets in the library in 1911, and only 8 current periodicals were received; for 1920 the figures are 11,278 books and pamphlets and 453 serials. In 1912 there were less than 2,000 specimens in the herbarium; in 1920, over 157,000. About 3,700 species of plants, representing 1,500 genera, and over 900 horticultural

varieties, are now under cultivation in the plantations and conservatories.

(*d*) *Income.*—The municipal appropriation for maintenance has increased from $14,550 in 1911 to $68,478.33* in 1920; private funds income from $1,314 in 1910 to $34,163.83 in 1920; and endowment from $50,000 to $95,525.

* The original appropriation for maintenance for 1920 was $65,000. On August 20, the rate became $74,553, owing to an increase of all salaries as of that date. This does not take account of an appropriation of $22,500 for permanent improvements on the condition that private funds of a like amount be provided. This condition could not be met, and the appropriation, therefore, did not become available.

Similar comparisons might be made for every activity and department. A tabular statement is given in TABLE I (p. 25).

What It Has Cost

The total of annual expenditures from the tax budget of the City of New York for the maintenance of the Garden from 1911 to 1920 inclusive is $395,595. The contributions of private funds for this purpose, for the same period, have amounted to $162,013. In 1919 more than one half the cost of maintenance was met from private funds, to the great detriment of our educational and scientific work.

For permanent improvements, including initial grading and topsoiling, and construction of walks and buildings, there have been expended, of corporate stock and special revenue bonds of the City of New York $274,744, and of private funds $129,577.

By the terms of the *Agreement* between the City and the Brooklyn Institute of Arts and Sciences for the administration of the Garden, it is provided that the necessary cost of maintenance shall be met by the City, but that the purchase of all plants shall be made from private funds. In addition to this, it has been the practice of the Garden from the beginning to purchase all books for the library, herbarium specimens, lantern slides, negatives, and photographs, and all other illustrative material from private funds.

The grand total of expenditures for all purposes—construction of buildings and conservatories, grading, topsoiling, initial plant-

ing, construction of walks, bridges, steps, and ten years of maintenance—has been $870,000, of which $291,590 have been met from private funds, as against not more than $50,000 of private funds required by the terms of the *Agreement* with the City. For the ten-year period the City has appropriated for Botanic Garden maintenance only One Dollar for each $5,300 of the total tax budget; for the year 1920 the ratio was One Dollar for each $4,000. The cost for 1920 was at the rate of 3.4 cents for each inhabitant of the Borough, and for the entire ten years 33.5 cents, but since the cost is distributed over the entire population of Greater New York (over 5,600,000), *the actual cost for 1920 is one cent per inhabitant,* and less than eight cents for the entire ten years. Moreover, this small expenditure has brought contributions of private funds from public-spirited citizens amounting to about one third of the municipal appropriations.

What the Garden Has Meant to Brooklyn

What service has the Botanic Garden rendered to the City, in return for this expenditure of money and effort? In the first place, a tract of nearly 50 acres of city property, having an assessed valuation of some $2,500,000, and lying idle, serving no useful public purpose, part of it being used only for a dumping ground, and situated at the center of population of the Borough, has been converted into one of the most beautiful and attractive areas in the city, meeting educational and recreational needs of hundreds of thousands annually. The elementary and secondary education of pupils in the grammar and high schools of the city is being enriched, added opportunities for profitable recreation are being afforded, advantages of free public education of adults and children have been enlarged, the increase and dissemination of useful knowledge in this community and throughout the scientific and educational world are being promoted, and altogether the Borough of Brooklyn and the greater city have been made a better place in which to live. Each year the demands of the public, and its response to the opportunities offered by the Garden have given increasing evidence of the need of a botanic garden in Brooklyn.

What the Garden Has Meant to Botanical Science and Education

(*a*) *Investigations.*—Plans for the scientific work of the Garden provide for placing the emphasis largely on the experimental phases of the science, such as genetics and plant breeding, plant diseases, ecology, and physiology. In systematic botany attention has been given chiefly to the local flora, including the region roughly indicated by a circle of 100 miles radius from Brooklyn as a center. The curator of plants, Mr. Taylor, the first member to be appointed to the scientific staff, has devoted most of his attention to this latter work. The results of this study are embodied in a Memoir of 592 pages, and in numerous papers published in current botanical periodicals. An intensive study of the vegetation of Long Island is now in progress.

The second curatorship to be filled was that of public instruction, and the scientific work of the first incumbent, Dr. E. W. Olive, was in plant diseases. During 1916 Dr. Olive spent about ten weeks in Porto Rico collecting and studying the fungi (especially the plant rusts) and the plant diseases of that island. A number of forms new to science were discovered, our cryptogamic herbarium was enriched by several hundred specimens, and duplicate sets of specimens were prepared for exchange with other institutions.

In July and August, 1917, Dr. Olive spent some weeks in Texas investigating a sudden outbreak of rust disease on cotton for the U. S. Department of Agriculture. Part of the summer of 1918 was spent in plant disease work in New York, Virginia, and Pennsylvania, in cooperation with the Plant Disease Survey and Cereal Disease offices of the U. S. Department of Agriculture, the Pennsylvania State Department of Agriculture, and other institutions. Assistance was also given in the investigation of the new and serious potato-wart disease which made its appearance in Pennsylvania. Some of the scientific results of Dr. Olive's work are embodied in three papers, which have appeared as Brooklyn Botanic Garden *Contributions*, Nos. 6 and 17, and in volume one of the Garden *Memoirs*.

The third curatorial appointment was that of Dr. O. E. White, to the curatorship of plant breeding. This work has been based largely upon the garden pea, Indian corn, castor oil plant, and

other economic plants, and the published results include eight papers appearing in American and European journals. During 1918, Dr. White spent several months studying various problems connected with the growth and utilization of the castor oil bean, in cooperation with the National Research Council.

Other investigations include a study of the effect of smoke and fumes on the street trees, lawns, gardens, and other vegetation of one of the boroughs of Greater New York, by the director; studies, still in progress, in the evolution of the Boston fern (*Nephrolepsis*), by Dr. R. C. Benedict, resident investigator; a survey of the diseases of the trees in the Garden and in Prospect Park, adjacent thereto, by Dr. George M. Reed, now curator of plant pathology, but at that time resident investigator; and numerous other minor studies by members of staff and registered students.

In closing this brief résumé of the scientific output of a small body of workers, attention should be called to the fact that it has not been merely a matter of academic interest for a few impractical specialists, removed in the imaginary recesses of their laboratories and library from the activities and needs of everyday life. As the above account shows, most of the problems that have engaged the members of the Garden staff have been of large economic importance, directly affecting public health and comfort, the cost and pleasure of living, the physical and intellectual well-being of the people. Such, by and large, is the significance of most modern scientific research.

Cooperation with the Federal Government.—Since November, 1917, the Garden has extended the facilties of its laboratories and herbarium to further the investigations in progress here under the joint auspices of the Bureau of Markets and the Bureau of Plant Industry of the U. S. Department of Agriculture. This work is under the immediate supervision of Mr. F. C. Meier, of the Bureau of Markets, and Dr. Charles Drechsler, of the Department of Agriculture, was in residence at the Garden from July 1 to December 31, 1920, as special investigator for the Department.

As a recent writer has tersely expressed it, every time we buy four potatoes we pay for a fifth that we do not get because it has

been destroyed by disease. For the same reason, for every two sweet potatoes we buy we pay for a third, and for every tomato we pay twice what we should. Much of this loss could be reduced or eliminated by a better understanding of plant diseases. The ultimate economic result of this work in our laboratories should be the supply of a uniformly better quality of food, and at a material reduction in cost to consumers in Greater New York.

(*b*) *Publication.*—Publications by staff and students during the ten-year period include 362 scientific and occasional papers, reports, and reviews, besides innumerable abstracts of botanical literature, and eight books.

Six periodical publications have been started and continued, as follows: *Contributions,* irregular (1911), RECORD, quarterly (1912), *Leaflets* (weekly or bi-weekly, April to October, (1913), *American Journal of Botany,* monthly, in cooperation with the Botanical Society of America (1914), *Memoirs,* irregular (1918), *Ecology,* quarterly, in cooperation with the Ecological Society of America (1920). The above publications comprise, to date, over 4,600 pages of scientific contributions.

A glance at the map (Fig. 2) will show that the publications of the Brooklyn Botanic Garden go to practically every country and to all the more important intellectual centers in the civilized world. Moreover, the lines on the map not only radiate from Brooklyn; they also converge thither, indicating that publications from this wide geographical range are received in our library, where they may be consulted free daily by all who wish.

(*c*) *International Seed Exchange.*—Since many years it has been customary for the botanic gardens of the Old World to issue lists of seeds offered in exchange to other similar institutions. In 1914 the Brooklyn Botanic Garden printed and distributed its first *List of Seeds.* As a result of the exchange relations thereby established, we have received from other botanic gardens over 3,000 packets of seeds from which our collections of living plants have been enriched, and, in return, we have distributed over 8,000 packets. This work was organized by our horticulturist and head gardener, Mr. Free.

(*d*) *Popularization.*—Popularization means bringing to or spreading among the people. Only a small fraction of one per

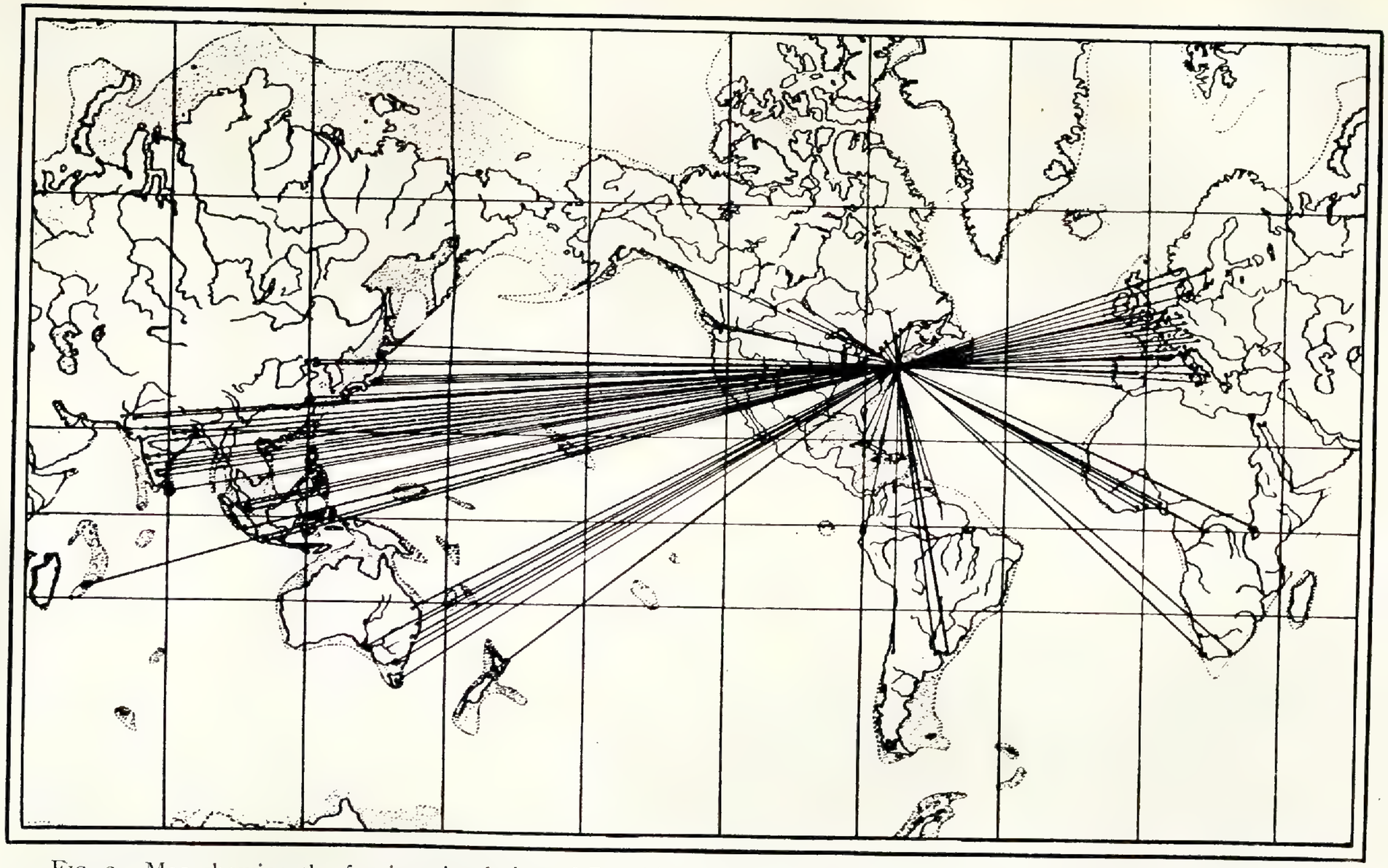

FIG. 2. Map showing the foreign circulation of Brooklyn Botanic Garden publications, as of December, 1920. The lines are significant in both directions, for publications are currently received in the Botanic Garden library from most of the foreign points to which the Garden publications go. The library is open free to the public daily.

cent. of the people are engaged in extending the boundaries of human knowledge, that is, in scientific research. A somewhat larger, but still very small percentage is interested or able to keep in touch with the advancement of science; the majority of these comprise the faculties, student bodies, and alumni of our colleges and universities. There remains the vast bulk of the population, some of whom are interested, more or less superficially, in natural knowledge, chiefly as an incidental added interest in life, but many of whom are deaf, dumb, and blind to the processes and beauties of nature, and need to have their interest aroused in order to appreciate the importance of scientific work, to have intelligent sympathy with it, to appreciate the necessity of its support by private and public agencies, and to realize how its pursuit and its results enrich human life in every way. This problem of education for the people is one whose magnitude is equalled only by its importance. It should challenge the united effort of all those who have at heart the best interests of science, of education, and of society. Above all it should be generously supported by all governmental agencies, national, state, and municipal. "Promote," said George Washington in his Farewell Address, "*as an object of primary importance,* institutions for the increase and diffusion of knowledge." Nothing is more calculated to favor the advancement of scientific research than a high general level of intelligence among the people.

This is the creed and the conviction which has animated and given direction to the organization and activities of the Brooklyn Botanic Garden during the past ten years, and nothing has been more gratifying than the response of the public to the opportunities afforded by the Garden, free to all the people, all the time, to learn more of the beauties and meaning of plant life, and to enjoy the peculiar intellectual satisfaction thereby afforded. The extent of this response is amply recorded in the statistics on pages 24–26, and also in words of encouragement and commendation, and in contributions to the support of the work which are constantly being received. It would be difficult to overstate the loss to the intellectual, aesthetic, and social life of the community if all that its Botanic Garden has come to mean were to be eliminated.

Not a day passes that we are not called upon to supply some item of information about plant life to educational, charitable, and commercial institutions, to municipal departments, and to teachers and other individuals. In addition to the lectures, classes, *Leaflets,* and other publications, the labeled collections of living plants, the special gardens, the herbarium, and the library are silently but constantly ministering to the needs of the people.

The Next Ten Years

The purpose of the preceding overlook of the first ten years of the Garden was to indicate the need of such an institution as this in this community, and the manner and extent to which the Garden has been able to meet this need. But the chief advantage of looking backward is to obtain perspective, and a better indication of the lines along which further development may best proceed.

In the first years much of our resources, time, and energy went, of necessity, into foundational work. During the next three or four years the grading and planting of the grounds should be well along toward completion, so far as the larger features are concerned, and from now on, increasing yearly, it is hoped that the best energies of the Garden can be devoted to the extension and improvement of botanical investigation and education.

Importance of Plant Disease Investigations.—One year ago I urged the desirability of establishing at the Botanic Garden a laboratory or institute of plant pathology, and dwelt upon the economic as well as the scientific importance of this work. As an indication of the former it may be noted here that during the calendar year 1920 over $5,000,000 were paid by the railroads of the United States in settlement of claims for losses due to the spoilage of perishable fruits and vegetables, and this, of course, represents only a portion of the total loss and of claims filed. One carrier alone, with terminal in New York City, paid losses of over $110,000 on apples, over $88,000 on small fresh fruits, over $37,000 on peaches, nearly $50,000 on potatoes, over $15,000 on celery, and a total of all claims of this class of nearly $464,000. Much of this loss could be reduced, and some of it

could probably be prevented if inspectors and field workers could only be supplied with more knowledge as to the nature and causes of the diseases to which the spoilage is chiefly due. It is hoped that the investigation necessary to supply this knowledge can be established at the Botanic Garden in the near future on a permanent foundation, commensurate with the extent of the need and the importance of the work.

RÉSUMÉ OF 1920

Investigations

Plant Breeding.—Investigations of the laws of heredity and variation in plants have been carried on as heretofore by the curator of plant breeding, with the full-time aid of one assistant, since July 1. These have led to the discovery and isolation of several new genetic factors in garden peas, particularly one which distinguishes narrow scimitar podded varieties from the ordinary types with wide, straight or but slightly curved pods. One new seed-coat color pattern—striping—has been discovered, and studies so far made indicate that at least two genetic factors are involved in its heredity. Studies on inheritance of purple pod, yellow pod, and green pod color have thrown some new light on the genetic relations of these characters and their genetic factors. Studies on inheritance of height in peas, covering a large number of varieties, indicate that a very complex genetic basis is involved. Several new factors for height have been isolated. The main studies on linkage among the genetic factors of peas are progressing satisfactorily, although still hampered by lack of adequate facilities in the way of trained assistance, satisfactory land for pea cultures, greenhouse space, and a calculating machine. Investigations on garden peas by plant-breeders all over the world have resulted in isolating and working out the inheritance to date of over eighty hereditary characters. Genetic studies of corn and castor beans have been given up here because of lack of facilities. Miss Meyer has rendered valuable assistance from the time of her appointment as part-time assistant in the spring. Since July 1, her whole time has been devoted to plant-breeding work.

During August, while on vacation, the curator of plant breeding visited the genetic departments of Cornell University, University of Michigan, University of Wisconsin, University of Minnesota and South Dakota State College.

During the year, as collaborator for the department of genetics of "Botanical Abstracts," about thirty abstracts of genetic papers have been prepared by the curator. He has also acted on a committee of the American Society of Naturalists for securing a uniform code of genetic symbols and nomenclature.

Dr. R. C. Benedict, resident investigator, has continued his investigations of variation in the genus of the so-called "Boston fern," *Nephrolepis*. Some of the recent results were embodied in a paper on "Sporeling Mutation in *Nephrolepis*," read before the Botanical Society of America at Chicago during the last week of December.

Ecology and Plant Geography.—An account of the continuation of the studies of the curator of plants on the vegetation of Mt. Marcy and of Long Island, Gardiner's Island, and of the endemic flora of the Bahama Islands, and the beginning of a comprehensive ecological and phytogeographical survey of Mt. Desert Island, Maine, is given in the appended report of the curator. A report of the Mt. Marcy survey appeared during the year in three installments in the new journal, *Ecology,* published by the Garden. The institutions cooperating in this study were, besides the Botanic Garden, the Roosevelt Wild Life Forest Experiment Station of the New York State College of Forestry at Syracuse University, the Vermont State Agricultural Experiment Station, and the Ecological Society of America. Valuable assistance in the field arrangements, with the Ausable Club as a base, were rendered by Mr. Alfred T. White, chairman of the Botanic Garden Governing Committee. One of the more significant facts that emerged from the investigation is that the alpine plants and animals above the timber line are not encroaching on the region below, but the lowland forms are slowly but surely invading the higher altitudes. Valuable quantitative data are also being collected with a view to throwing additional light on the causes of a timber line on mountains.

Cooperation with the Federal Government.—The cooperative

arrangement, noted on page 29, and in my last annual report, between the Bureau of Markets, U. S. Department of Agriculture, and the Garden has continued, as previously, under the immediate supervision of Mr. F. C. Meier. The problem is the study of transit and storage diseases of fruits and vegetables. It is eminently fitting that the Garden should cooperate in this work, for the losses due to these diseases contribute directly and in large measure to the high cost of food in our city markets.

Herbarium

The curator of plants notes the acquisition of the collection of the Rev. L. H. Lighthipe of about 7,000 specimens, mostly mounted. The mounting of other unmounted specimens has been restricted to about 2,800 on account of the fact that the herbarium cases are now full to capacity. Public use of the herbarium increases each year, and additional cases must soon be provided if the specimens are to be properly protected and made accessible.

Conservatories

The necessity of keeping the conservatories closed during 1918 has greatly affected the attendance since then, but the loss is gradually being recovered as is shown by the recorded attendance of 13,588 as against only 7,688 in 1919.

Our collections have quite outgrown our accommodations and further increase or enrichment will not be possible until the new range, for which a site is reserved on the adopted plan of the Garden, can be constructed.

Library

During the year the library has been enriched by the addition of complete files of important journals hitherto lacking, and especially by the acquisition of a number of rare pre-Linnaean classics, including one of the botanical incunabula. The accessions total 460 books and 537 pamphlets. The total number of volumes is 6,500, and of pamphlets 4,778. Over 450 serial periodicals are currently received.

Cooperation with Schools

The map facing page 42 of this report indicates the geographical extent to which the Garden has served the needs of schools in Brooklyn, Queens, and Lower Manhattan. We are now meeting demands nearly to the limit of our capacity. Statistics concerning this work may be found on pages 24 and 25, and in the appended reports of the department of public instruction and the curator of elementary instruction.

Cooperation with the Board of Health

During the summer, in response to a request from the New York City Board of Health, the Garden supplied specially prepared mounted specimens of poison ivy (*Rhus toxicodendron*), with five-fingered ivy (*Parthenocissus quinquefolia*) mounted on the same sheet for comparison; jimson weed or thorn apple (*Datura Stramonium*); great ragweed (*Ambrosia trifida*), and small ragweed (*A. artemisifolia*). These specimens were for use at various stations of the Board in its campaign of popular education concerning poisonous plants and those causing hay-fever. Among the latter plants, the ragweeds are the most notorious offenders, and are still found growing wild, in vacant lots and elsewhere, in every section of the city. Thanks to the Board of Health, measures are being taken to secure the extermination of these plants from within the city limits.

Plantations and Grounds

Work on the grounds suffered in 1920 more than any year since the Garden was established. This was because the small municipal appropriation ($734) available to meet the cost of labor threw a burden on private funds greater than could be met, except in part. Taking public and private funds together, only 2,451 men-days were available. The number of men-days for 1919 were 4,032. Spring work did not begin until April 5—the latest date in the history of the Garden, the date in 1919 being March 10. Fall work closed November 5, though the open season would have permitted the work to continue until as late as December 1. Very little new work could be accomplished, al-

though several acres are still quite undeveloped, and maintenance had to be reduced below the point necessary to maintain proper standards. The details are given in the appended report of the curator of plants.

School for Gardeners

In my preceding report I noted the establishment of a school for the training of gardeners, and the cooperative agreement entered into with the Federal Board for Vocational Education for the enrollment of disabled soldiers, sailors, and marines in these courses. This school has increased in size, and the curriculum has been enriched. Any young man contemplating gardening as a life work may now find here opportunity for training such as is offered in only two or three places in the United States.

Establishment of a New Botanical Journal

In 1914 the Garden, in cooperation with the Botanical Society of America, made possible the establishment of a much needed new journal, the *American Journal of Botany,* for the publication of the results of botanical research. That journal is the official organ of the Botanical Society of America.

The rapid development of botanical science in the direction of Ecology (the study of plants in relation to their environment), found expression in 1915 in the organization of the Ecological Society of America, and shortly thereafter the need began to be felt for more ample opportunities to publish the results of ecological investigations. This need began to be acute in 1919, and in the latter part of that year inquiries were made as to whether the Brooklyn Botanic Garden was in a position to render to ecology a service similar to that rendered to botany in general in 1914 in the matter of a new journal. Negotiations were entered into between the Garden and the Ecological Society which finally led to a cooperative agreement for launching and publishing a new journal to be called *Ecology.* The terms of this agreement are published as Appendix 6 of this report. *Ecology,* issued quarterly, is the official organ of the Ecological Society, and is devoted to both plant and animal ecology. The four numbers of 1920 comprise 313 pages.

Resignations and New Appointments

Resignation of Dr. Olive.—Dr. Edgar W. Olive, curator of public instruction and also in charge of Plant Pathology at the Garden since September 1, 1912, resigned on February 24, to enter business. The resignation took effect on July 1. This resignation was due to the economic pressure felt since the war by practically all of those engaged in educational and scientific work. The Botanic Garden, like many colleges and universities, is unable to advance its salaries to a point where they are attractive in competition with the emoluments of business, and many professional men, often late in life, have recently been obliged to change their occupation in order to secure adequate incomes. Dr. Olive had rendered valuable service to the Botanic Garden, and the lesson of his, and other similar resignations throughout the country, is obvious. If the best men are to be retained in the vital work of teaching and research, and if new men of the first ability are to be recruited, the compensation must be adequate to insure the maintenance of a proper standard of living for a family, a reasonable margin for investment, and freedom from economic worry. Substantial increases during the past twelve months have not yet brought our curatorial salaries to the figures now being paid to professors in our best colleges, universities, and museums.

A New Curator of Plant Pathology.—Subsequent to the resignation of Dr. Olive, a generous gift of private funds, acknowledged elsewhere in this report, made it possible to reorganize the work for which he was responsible by the creation of a new curatorship of plant pathology, thus permitting the curator of public instruction to devote all of his time to that work which has steadily grown in amount and importance, and affording the entire time of the new curator for plant disease investigations and administration. Before this report is printed the details of this new curatorship and the appointment thereto of Dr. George M. Reed, for the past two years pathologist in the Office of Cereal Investigations, U. S. Department of Agriculture, will have appeared in the Botanic Garden RECORD for January, 1921. Dr. Reed will enter upon the duties of his new position on January 1, 1921.

Assistant Curator of Elementary Instruction.—The duties of this position were discharged by temporary assistance until September 1, when Miss Elizabeth Elmer was appointed Acting Assistant Curator.

Financial Matters

Municipal Appropriations.—The original appropriation of the Board of Estimate and Apportionment for maintenance for 1920 was $65,000. In addition there was voted an appropriation of $22,500 for permanent improvements, but this was made conditional on the Garden providing a like amount from private funds. This amount was greatly in excess of our entire income from private funds, most of which, moreover, is restricted by terms of gift to our educational and scientific work, and the remainder was required to make up the deficiency in the maintenance appropriation. It was not found possible to meet the city requirement by solicitation of special subscriptions, and so the entire amount of $22,500 reverted to the City. Greatly needed permanent improvements, including a new fence, new bridges, steps, and retaining walls, new underground storage room, and new herbarium cases and library stacks, are still unprovided for and are more urgently needed than ever.

As a result of mandatory legislation a new schedule of personal service became effective on August 20, so that (as stated on page 26), the total municipal appropriation that became available for maintenance was $68,478.33. This appropriation is quite inadequate to our needs, and throws a burden on private funds income that was never anticipated when the Garden was established.

Private Funds.—The permanent endowment funds of the Garden have increased by only $2,025, making the total $95,525. The annual endowment income, as of December 31, 1920, is $8,415. The realization of plans, already approved by the Botanic Garden Governing Committee, for the development of our scientific and educational activities call for an endowment sufficient to insure an annual income of from $50,000 to $75,000.

Need of Provision for Endowment Increment.—In a growing institution the need of funds increases annually, and commonly

more rapidly than the income itself. Provision to meet this increasing need, at least in part, could be made by funding each year a certain percentage of the income. During the first few years this would reduce the available income, but not enough seriously to cripple the work, and whatever of disadvantage might result would be more than offset by the great advantage to be derived in a term of years. It emerges, for example, that if 20 per cent. of our present annual income *from funds restricted by terms of gift or otherwise to the educational and scientific work of the Garden,* were set aside each year and the interest compounded, our permanent endowment funds would increase by more than $50,000 in less than twenty years. Our present annual income, however, will increase, so that the endowment increment would be much greater than the figures just named. The adoption of some such plan, beginning as of January 1, 1921, is strongly recommended.

What the Botanic Garden Needs

Endowment for Research.—Briefly stated, the Botanic Garden chiefly needs additional resources so that its scientific and educational work may be extended and improved. This is, without question, our most urgent present need. In my preceding *Annual Report* I directed attention to the need of additional provision for research with special reference to plant diseases, and to the advantages afforded by the location and equipment of the Brooklyn Botanic Garden for the prosecution of such work here. It was pointed out that an annual income of $50,000 would make possible the establishment of a Laboratory or Institute of Plant Pathology, as a department of the Garden. While this ideal has not yet been realized, I am pleased to record here the announcement made to the Board of Trustees, at its meeting of November 18, 1920, by the Chairman of the Botanic Garden Governing Committee, Mr. Alfred T. White, of pledges on behalf of himself and two other friends of the Garden of $50,000 for the inauguration of this work. This principal sum is to become available in stated amounts as needed during the next four years. In announcing these pledges, the hope was expressed by the chairman

that additional provision would be made for the establishment of this new department in perpetuity, and on a scale commensurate with its scientific and economic importance.

Improvements and Replacements.—Perhaps the most urgent replacement needed is a new, unclimbable fence to enclose the entire garden. Attention was first called to this need some three years ago, but the City authorities have not yet granted our annual requests for an appropriation for this purpose. Three flights of wooden steps and two wooden bridges, built six years ago (1914) as temporary structures, have become both unsightly and unsafe and should be replaced at once. The conservatory plaza, with lily pools, brought to its present stage of development by a gift of private funds, should be completed, as should also the adjacent area in front of the laboratory building. Plans have been tentatively approved for a rose garden adjacent to the esplanade on the west, and it is desirable to construct this garden as soon as funds can be secured. Its aesthetic and educational value, and its effect on attendance will be comparable to that of the Japanese garden in 1915, the rock garden in 1916, and the iris garden in 1917.

The need of additional land outside the present boundaries of the Garden, but easily accessible for a nursery and experimental plot, has been noted in several preceding reports, but has not yet been met. It will not be long before the lack of such a plot will greatly impede our research work and restrict the development and maintenance of our plantations.

Sabbatical Year and Pensions.—The desirability of providing for retiring allowances for all, and a sabbatical year for curators, mentioned several times in preceding reports, is here reiterated. During the year figures have been submitted to the Committee by the director, showing the cost of a contributory plan of retiring allowances.

Acknowledgments

A list of gifts and donors is given in *Appendix 1* (pp. 68–71). These gifts have all been reported to the Botanic Garden Governing Committee during the year, and have been received with the thanks of the Committee. It is a pleasure to record here,

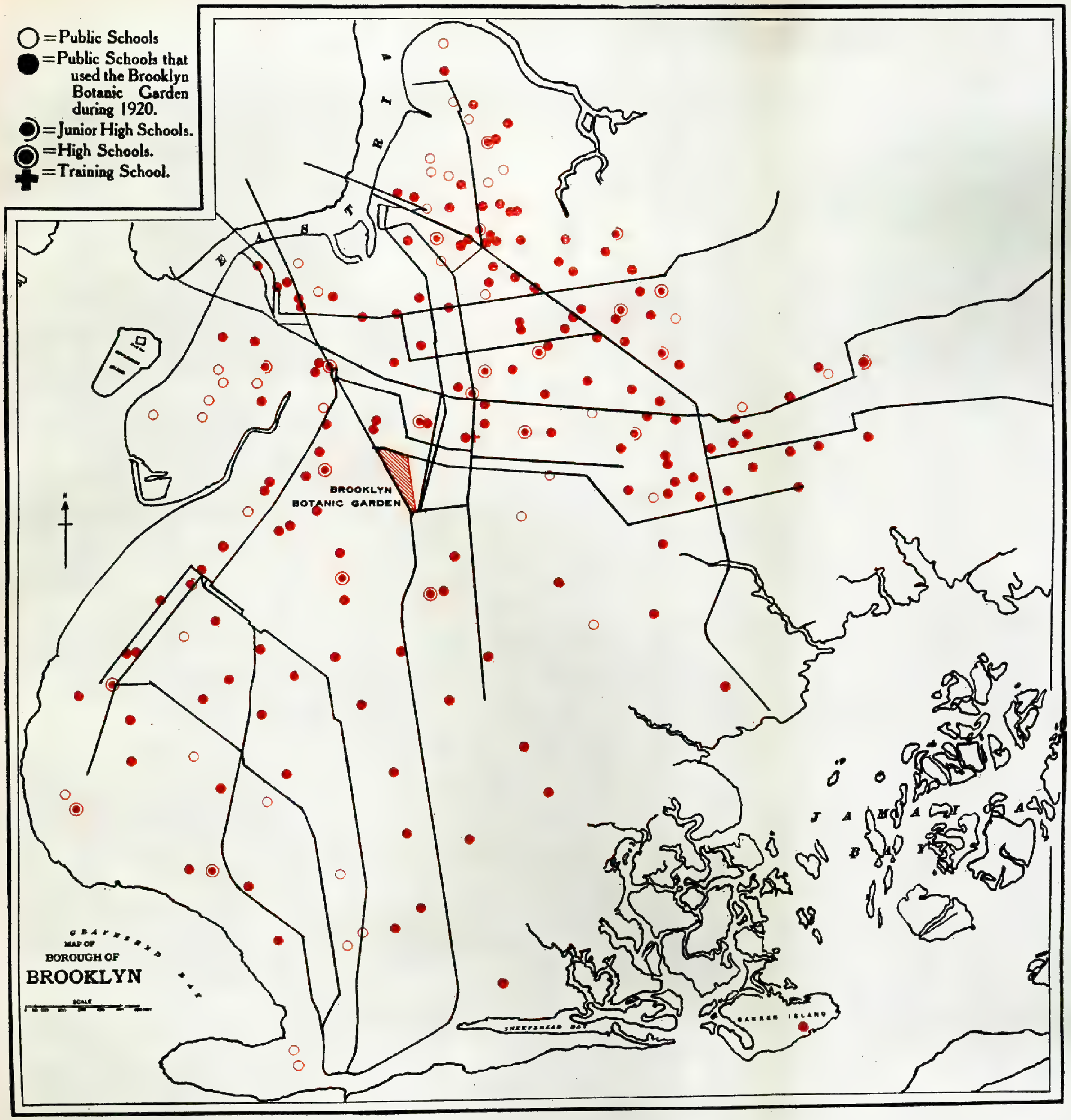

FIG. 3. Map of Brooklyn, showing the location of public schools that have made use of the facilities of the Brooklyn Botanic Garden during 1920. Solid dots in circles designate high schools; solid dots with semicircles, junior high schools; solid dots alone, grammar schools; open circles, grammar schools that have not, as yet, made use of the Garden. The cross designates the Brooklyn Training School. Solid lines designate lines of rapid transit. Seventy-eight per cent. of grammar schools and one hundred per cent. of high schools used the Botanic Garden during 1920.

also, our appreciation of the gifts, and especially of the thought that prompted them.

Accompanying Papers

The Annual Reports of heads of departments, financial statements, and Appendices 1–6, including a list of gifts received (pp. 68–71), publications and addresses by members of staff (pp. 71–74), *Agreement* with the American Iris Society (p. 78), and meetings held at the Garden during the year, are appended as a part of this report.

Respectfully submitted,

C. Stuart Gager,
Director.

REPORT OF THE CURATOR OF PLANTS FOR 1920

Dr. C. Stuart Gager, Director:

Sir: I take pleasure in submitting herewith my report for the year ending 31 December, 1920.

General Maintenance and Construction Force

Work began April 5 and ended November 5, a shorter period than for several years, due partly to an abnormally late spring and partly to shortage of funds for day labor. The number of men working was less than for some years in the past. For three of the busiest spring months there was an average of 23–26 men; for seven weeks ending June 18 an average of 17–20 men, and for the balance of the season 10–12 men. Naturally the grounds were not kept up as well as they should have been, and nothing like so well as in the year 1919.

New work done was as follows:

1. Grading and putting down lawn along west side of the northerly Conservatory Court Garden.
2. Grading and putting down lawn along east side of brook, the land formerly used as "war gardens."
3. Completion of dams and outlet for lower end of brook so that water may be turned in during 1921.

4. Cleaning and putting down lawn on the area north of the rock garden.
5. Grading and putting down lawn on easterly edge of fir and spruce collections.

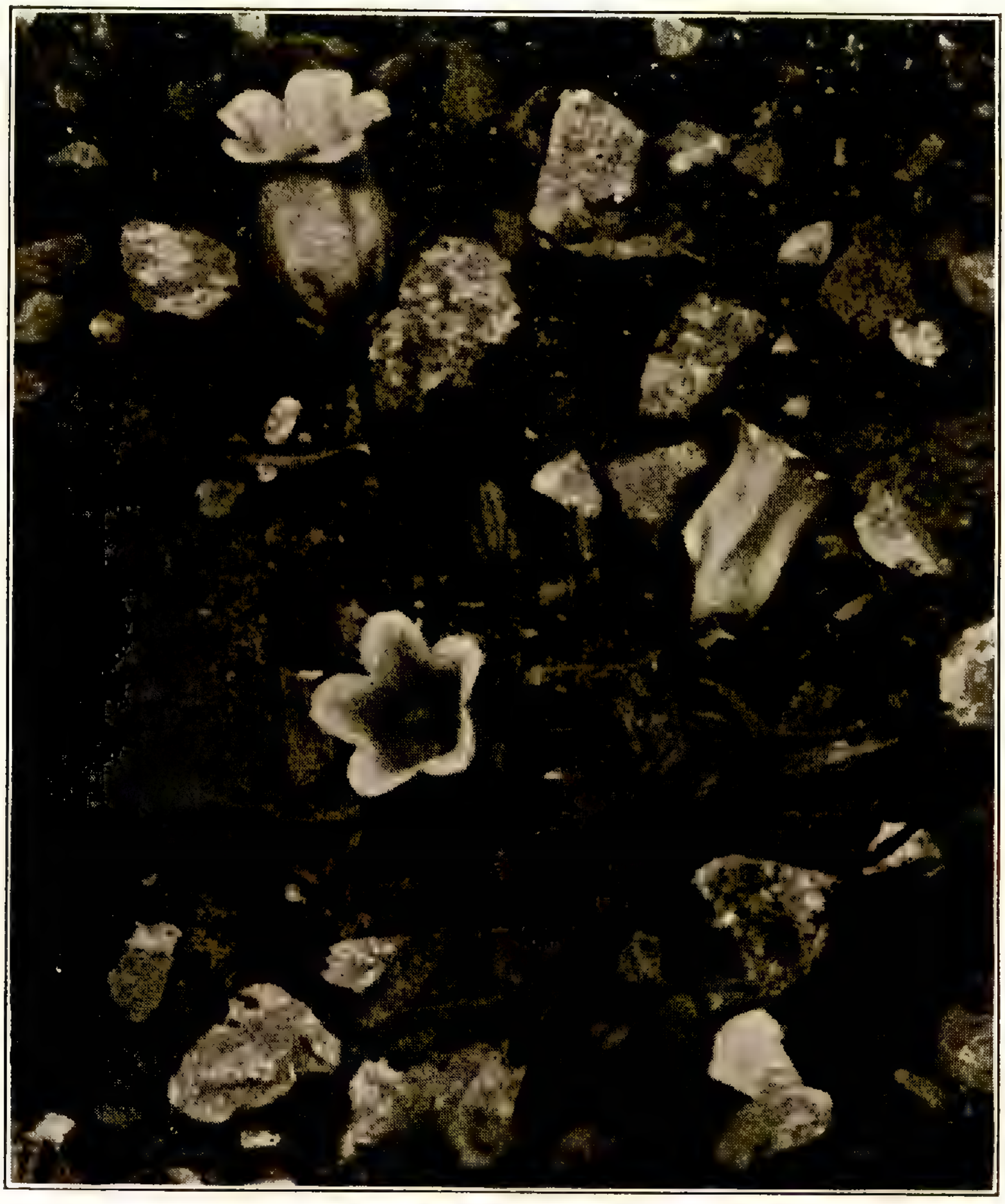

FIG. 4. *Campanula Allionii.* An alpine from western Europe, rarely seen in America. Note the size of the flowers compared with the plant from which they spring. The height from the soil to the topmost flower is about five inches. Under cultivation it requires "moraine" conditions—provided in the Brooklyn Botanic Garden by excavating the soil in a part of the rock garden to a depth of two feet and filling in with a mixture composed of ¾ in. crushed stone 5 parts, sand 1 part, and leaf-mold 1 part.

6. Museum site worked as a source of top-soil after the "war gardens" on it were stopped.

There was of course the usual amount of digging of holes for gardening, maintenance work on lawns and walks, and the painting of over 900 feet of wire fence around the experimental garden.

Gardening Force

New work accomplished during the year was as follows:

1. Conservatory Court Gardens planted, some only temporarily, with Dahlias, Larkspurs and Snapdragon.
2. Lily pool planting, the north one with tender water lilies, including Victoria Cruziana, and the south one with hardy kinds.
3. "Filling in" planting among Rosales with Spiraea, Prunus, etc., and in Magnoliaceae with Magnolia.
4. Azalea Hill near terminal pool partly planted.
5. Ten thousand Darwin Tulips, "Gretchen," were planted in the grass on the west facing slope of Crataegus Hill west of the building.
6. Planting in part, the formal garden north of the Children's House.
7. Replanting German Iris to make room for the Japanese Iris which are coming as the result of our agreement with the American Iris Society.

The gardening force, as before, was under the supervision of Mr. Free, but the number of gardeners was no larger than in the past. Considerable help was given by the student-soldiers in the above work, however, in the course of their regularly assigned practice work.

Labelling and Record Work

The number of labels made was as follows:

Steel plant labels	309
Steel family labels	66
Large wooden labels	51
Small wooden labels	52
Large lead labels	44
Greenhouse lead labels	80
Total	602

Besides many signs, notices, etc.

The consignment numbers 20–1 to 20–35 were assigned during the year to a total of 495 different plants which were added to the synoptic collections.

The work of looking after the records of the living collections, their labelling, accessioning, etc., has been, as before, under the supervision of Dr. Gundersen with the help of Mrs. Margaret Burdick, and, for part of the time, that of Miss Margaret Chapin. A revised list of the conservatory collections, and of the herbaceous plants has been prepared, based on inventories made during 1919, and a new list of the genera in the Garden prepared. An inventory was also made of the plants in the frames and propagating houses. Maps are complete of all outdoor collections and now safeguard our records, no matter what vandals may do to the labels.

One useful addition to the herbarium collection has been prepared by Miss Chapin. It consists of a named set of fruits, usually those too bulky to be mounted. They are in boxes, properly labelled and arranged in such fashion as to be readily available.

Phanerogamic Herbarium

Specimens mounted during the year totalled 2,857 which is about one third of the number during the previous year. Space in the Herbarium cases is very nearly filled to capacity and that is the chief reason why mounting has been retarded. There are now over twenty thousand unmounted specimens in the Herbarium work room that should be mounted and made available, but more herbarium cases are needed before this can be done.

The largest accession (by purchase) was the collection of the Rev. L. H. Lighthipe, consisting of over seven thousand specimens, nearly all mounted and which have been sorted into the general Herbarium. Gifts to the herbarium are listed in Appendix I.

Personal Activities

The work, noted in my last report, on Mt. Marcy was published in *Ecology* and reprinted as the Brooklyn Botanic Garden *Contributions*, No. 24. That part of it dealing with the vegetation was written by me while the balance of the report of "Plants

and Animals of Mt. Marcy" was by C. C. Adams, G. P. Burns, T. L. Hankinson and Barrington Moore.

Mr. Moore and myself began during the summer a comprehensive ecological and phytogeographic survey of Mt. Desert Island in Maine. On this island there is a tension zone, in a small area, of such widely diverse forest and phytogeographic types as the pitch pine, fir, spruce, *Quercus ilicifolia, Empetrum nigrum,* and many others. Here on one island, at sea level are to be found arctic-alpine and southern coastal plain vegetation types, and the opportunity to study the limiting factors is unrivalled. It is planned to continue the study over a period of years and ultimately write a report upon the vegetation and forest types of the island. A preliminary paper on "Plant Composition and Soil Acidity of a Maine Bog" was read before the Ecological Society of America at the Chicago meetings and will appear in a future issue of *Ecology.*

During the past year I completed a study of the endemic flora of the Bahama Islands begun five years ago. With the consent of and with many helpful suggestions from Dr. N. L. Britton who, with Dr. Millspaugh of the Field Museum in Chicago, is the author of the recently issued "Bahama Flora," my studies were based upon this book, and a paper on "Endemism in the Bahama Flora" was prepared and read before the Botanical Society of America at the Chicago meetings.

After repeated failures I was at last able to spend three days on Gardiner's Island where in the "Great Woods" is the finest climax forest anywhere near New York. I hope to spend a few more days there in the spring of 1921. The notes and photographs collected will be of the greatest use in the "Vegetation of Long Island" upon which I have been working for several years. Several series of atmometer records were made at Montauk, the barrier beach at Fire Island, and in the pitch-pine forest in the center of the Island. During the coming season weekly readings will be taken from certain of these places and one from the sand plains near New Haven, Conn., partly in cooperation with the Department of Botany at Yale. These records of the evaporating power of the air, in practically identical sites, but differing in their proximity to the sea-breeze appear to indicate significant

relations of the vegetation of Long Island to that wind. Several hundred tests of acidity and alkalinity, according to the new method of Dr. Wherry were made in different parts of Long Island during the season. Some of the atmometer readings were made by Mrs. Margaret Burdick who has also helped me very efficiently with a considerable amount of statistical tabulation of the Bahama Flora.

I was appointed by the Ecological Society one of a committee of three to arrange for the publication of *Ecology*. Its subsequent publication here at the Garden in cooperation with the Society has, I think, advantages both to the Garden and the Society. I have since served as the Garden's representative on the editorial board of that journal.

During the autumn I completed, at the request of P. F. Collier & Son, a popular book on "Plant Life" to be published as one volume of their "Book of Science" to be issued in April, 1921.

Respectfully submitted,

NORMAN TAYLOR,
Curator of Plants.

REPORT OF THE DEPARTMENT OF PUBLIC INSTRUCTION FOR 1920

Although this is the tenth annual report of the Botanic Garden, it is only the eighth annual report from the Department of Public Instruction. The appointment of the Curator of Public Instruction took effect September 1, 1913. In his first report, appearing in the RECORD of April, 1913, a tentative outline appeared, setting forth the proposed educational activities for the Brooklyn Botanic Garden. For the most part this program has been carried out, with some changes, which were largely brought about by the demand from the general public. For example, our regular class-work has increased more than any one other of our activities. From a total attendance of 544 in 1913, we have attained a total attendance in all our classes and lectures of 53,294. We have been able to do less with our loan collections than with any other phase of our work. This is due, not to the fact that

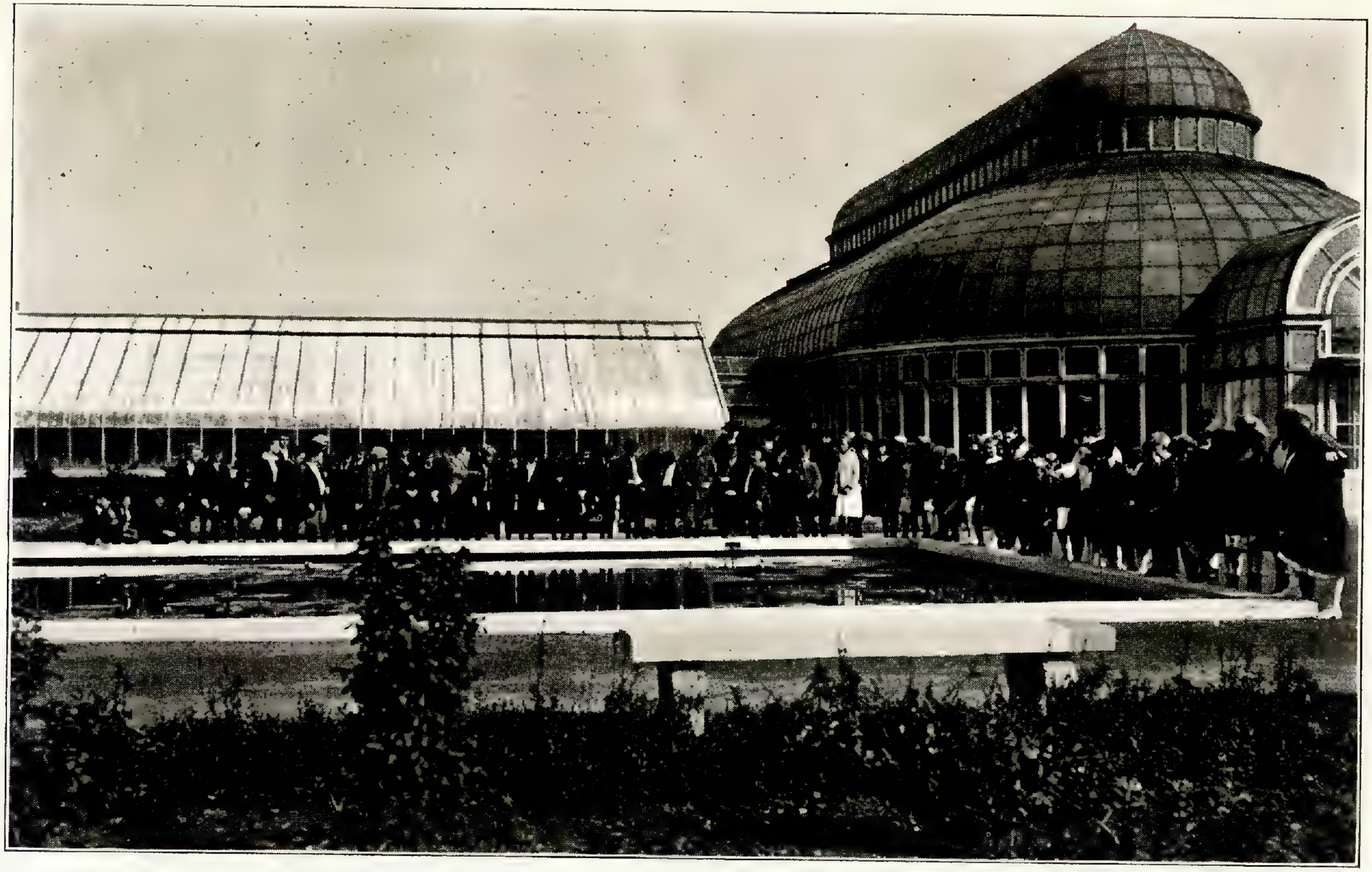

FIG. 5. Nature study classes from public schools, with their teachers, studying water plants in the conservatory plaza, preceding a lecture in the auditorium.

there has been no demand for this work, but that we have had no adequate appropriation of money to cover such work. To meet this demand it would be necessary to have a special fund from which to draw, and the services of one person to handle this work.

The course for the training of gardeners in cooperation with the Federal Board for Vocational Training, and the extension courses for teachers have shown a creditable increase in number, popularity and efficiency during the last year. The Educational Department alone gave 43 lectures outside the Botanic Garden proper with an attendance of 11,885. Such work varies from year to year, not only according to the public demand, but according to the special stress of work at the Garden. Fewer talks were given by the Educational Departments in 1920 than in 1919. This is largely accounted for by the increase in attendance in regular work at the Garden itself.

Three hundred thirty seven petri dishes were filled and distributed during the year. There were 35 requests from high schools for class materials such as mosses, ferns, algae, etc. The cryptogamic herbarium was increased by 507 specimens.

Ten *Leaflets* were published in Series VIII. During the year there has been an increased demand from other cities for our *Leaflets*.

Requests for the services of Mr. Stoll in Boy Scout work have increased during this past year. These calls are for Scout tests and field trips. Seven of these field trips have been conducted during the year, and nine groups of Scouts have met for test work. Mr. Stoll has met nearly 5,000 young people in his Scout activities at the Garden and through the calls that have come to us from the outside for his services.

The resignation of Dr. Edgar W. Olive, curator of public instruction since September 1, 1912, took effect on July 1. Since that date the undersigned, curator of elementary instruction, has served as acting curator of public instruction in addition to her regular duties.

The following table shows the attendance at the Brooklyn Botanic Garden during 1920.

TABLE I

Attendance at the Garden during 1920

	Jan.	Feb.	Mar.	Apr.	May	June	July
At regular classes	290	546	1,687	1,660	2,073	1,330	2,200
At visiting classes	300	0	251	2,343	3,340	3,769	1,000
At lectures to children	100	0	200	1,066	2,340	2,769	340
At lectures to adutls	0	0	80	550	200	75	60
At conservatories	0	0	1,200	1,900	3,317	945	950
Total registration at gates	24,382	21,620	19,757	32,239	24,910	25,177	53,323

	Aug.	Sept.	Oct,	Nov.	Dec.	Annual Totals
At regular classes	2,000	2,030	2,640	1,342	1,242	19,040
At visiting classes	0	1,460	5,937	3,594	978	22,957
At lectures to children	0	300	2,579	1,183	420	11,297
At lectures to adults	0	0	300	175	0	1,440
At conservatories	1017	1234	944	1,000	1,081	13,588
Total registration at gates	35,075	31,990	34,493	18,908	12,353	312,507

Respectfully submitted,

ELLEN EDDY SHAW,

Acting Curator of Public Instruction.

REPORT OF THE CURATOR OF ELEMENTARY INSTRUCTION FOR 1920

DR. C. STUART GAGER, DIRECTOR.

Sir: I beg to submit herewith my report as curator of elementary instruction.

The Curator of Elementary Instruction was appointed September 1, 1913, but because of the building conditions and lack of facilities at the Laboratory Building of the Brooklyn Botanic Garden, the appointment did not take effect actively until October 1. This, therefore, is the seventh annual report of these activities, counting three months only for the first year.

On October 6, 1913, the first regular class under this Department was held at the Brooklyn Botanic Garden. A request was made by Dr. Marguerite T. Lee, Head of the Biology Department of the Girls' High School, that a regular weekly class be given at the Botanic Garden for the benefit of her botany students. Not only one class was started, but two.

FIG. 6. Class from Stuyvesant High School (Manhattan). During 1920 this class came to the Botanic Garden regularly with their instructor for studies in the conservatories and plantations.

On October 22, we started our first course for the general public. This course consisted of five lectures on House Plants. Forty-six people registered.

The first classes for elementary school children were inaugurated on December 17, 1913. These classes, four in number, two after school and two on Saturday mornings, represent the beginning of our children's classes, that is, those classes which are made up by voluntary registration of the individual, and without reference to the schools. Dr. Lee's High School class of October 6 represents the first class coming here by request from the schools.

It might be pertinent here to say that, from a registration of approximately 100 in the fall of 1913, we have built up an annual registration of over 3,800 in the year 1920, and from an attendance of 544 in the fall of 1913, we have risen to an attendance of 53,294 at the end of 1920. The attendance in our voluntary classes alone is over 19,000. During the war years of 1917–1918 this attendance rose to about 25,000. This was due to the fact that the conditions arising from the war crowded our classes far beyond the limits to which any class should be numbered.

There are certain figures I should like to lay before you which show in themselves much more clearly than words, the work of this Department. It must be remembered that while this is the tenth anniversary of the Garden, it is only the seventh anniversary of the Department of Elementary Instruction. We started to supply the public schools of the Borough of Brooklyn with penny packets of seeds in 1914, when 21, or 12 per cent., of the elementary schools called for 25,000 packets. In 1920, 86, or 47 per cent., of the elementary schools, besides high schools, private schools and a few elementary schools in the Borough of Queens, were supplied with 128,540 packets.

Public lectures for school children are given at the Brooklyn Botanic Garden in the spring and fall of each year. Such lectures are held in school time and are a part of the school activities. In 1913, 9 schools attended these lectures; two high schools, two private schools, and one parochial school being included. In 1919, 47 different schools attended these lectures, while in 1920 only 21 came. On the face of this, it might look as if this work

had fallen off during 1920. This is not true. Schools apply for time when they may come, and when all the time is filled it is not possible to add other schools since there are only a certain number of days in each month, and since we are limited by the hours in the day as well as by the number of individuals to assist in this work. So during 1920 it happened that the 21 schools represented took up the entire time; in some cases every grade of a given school, beginning with the fourth, came to the Botanic Garden. I mention this because the figures stated here do not represent any drop in attendance, but simply a greater eagerness and more speedy request on the part of some schools for our work.

TABLE II

SCHOOLS SERVED BY THE BROOKLYN BOTANIC GARDEN DURING 1920

Borough of Brooklyn

142 elementary schools (78 per cent. of all elementary schools).
17 high schools (100 per cent. of all high schools).
1 junior high school.
3 private schools.
Brooklyn Training School for Girls.
Training School for Teachers.
6 parochial schools.
Adelphi College.
Total ..... 172 schools.

Borough of Manhattan

4 elementary schools.
3 private schools
Training School for Teachers.
3 high schools.
Hunter College.
Total ..... 12 schools.

Borough of Queens

9 elementary schools
Training School for Teachers.
1 high school.
Total ..... 11 schools.

A similar condition exists in our outdoor garden. This garden for children was started in the summer of 1914, the first summer the Curator of Elementary Instruction came to the Garden. Twenty-eight schools were represented in the garden during that year. In the year 1918, 56 schools were represented, while in 1920, 31 schools were represented. This drop is accounted for

in the following manner. During the war years we were assigned a larger area of space than belongs legitimately to the children's garden. We are now using the space allotted to us as the permanent children's garden area. During the war years we used the piece of land east of the children's house for war gardens. This land is now used for the formal flower garden and shrubbery, laid out and planted with a view to furnishing illustrative material in connection with class work with both children and adults.

During the year 1919, the Brooklyn Botanic Garden in its educational work came in touch with 112, or 62 per cent. of all elementary schools of the Borough of Brooklyn and 17, or 100 per cent. of the high schools. This does not include private or parochial schools which call largely upon us. The figures for this work during 1920 are shown in the preceding table:

We have two sizes of garden plots in our children's garden. One is 8 ft. by 10 ft. and the other 10 ft. by 17½ ft. The first

TABLE III

CHILDREN'S GARDEN CROP REPORT FOR THE SEASON OF 1920

Crop	Amount	Market Cost	Value
Beans	1,994 quarts	12 c. per qt.	$239.28
Beet	13,005	3 c. apiece	390.15
Beet tops	69 quarts	15 c. per qt.	10.35
Carrot	11,411	3 c. apiece	342.33
Celery	346 plants	12 c. a plant	41.52
Chard	1,811 quarts	20 c. per qt.	362.20
Corn	178 ears	5 c. apiece	8.90
Eggplant	15	15 c. apiece	3.25
Kohlrabi	2,878	3 c. apiece	86.34
Lettuce	4,537 heads	12 c. a head	544.44
Onion	4,144	2 c. apiece	82.88
Parsley	2,144 bunches	8 c. a bunch	171.52
Peas	2 quarts	20 c. per qt.	.40
Peppers	948	4 c. apiece	37.92
Radish	31,205	2 for 1 c.	156.02
Spinach	3,084 quarts	15 c. per qt.	462.60
Tomato	6,883	5 c. apiece	344.15
Total			$2.384.25

plot brings a rental from the child of 25 cents; the second, 50 cents. The average value of the crop taken from each plot of the

FIG. 7. View in the children's greenhouse, showing primulas raised by a class, and rattan jardiniers, also made by the class, ready to be wrapped up and taken home as Christmas gifts.

first type garden in 1920 was $19.70. The larger sized plots gave a crop averaging $38.22. The total value of all crops for 1920 was $2,384.25, from a total garden area of 5/8 of an acre. It might be of some interest to see the crop report from our entire garden for the season of 1920.

Personal Activities

During the last year the Curator of Elementary Instruction has edited the *National Plant, Flower and Fruit Guild Magazine*, which appears four times a year—January, March, June and September.

In the spring a series of three lectures on Children's Garden Work, Its Aims and Values, was given at the Froebel League.

Since September 1 I have also served as acting curator of public instruction, pending the appointment of a new curator.

Respectfully submitted,

ELLEN EDDY SHAW,
Curator of Elementary Instruction.

REPORT OF THE LIBRARIAN FOR 1920

DR. C. STUART GAGER, DIRECTOR.

Sir: I have the honor to submit herewith my report as librarian for the year ending December 31, 1920.

It is gratifying to state that it has been possible to accomplish within the past year some of the larger tasks projected in the report for 1919. The exchange list has been enlarged by fifty-two new exchanges, twenty-seven of which are from foreign countries; the lacunae in the back numbers of German periodical publications, due to war conditions, have in great part been filled; the pamphlet catalog has been completely rewritten, so that when the new cards have been filed, there will be one dictionary catalog to consult for all publications in the library; an inventory of the pamphlet collection has been taken; and over 250 completed volumes of periodicals have been forwarded to the bindery.

Accessions

The library has been fortunate in securing by gift from Mr. A. T. White the rare and historically interesting work of Leonhard Fuchs, "*New Kreuterbuch,*" dated 1543.

Other volumes of pre-Linnaean literature, including one incunabulum, received during the year may be mentioned: "*Contrafayt Kreuterbuch,*" 1532, first German edition, by Otto Brunfels; "*Herbarius,*" 1486; "*Commentarii,*" 1558, by Mattioli; Dodoens' "*A Niewe Herball,*" 1578; John Evelyn's "*Silva,*" 1664; Malpighi's "*Anatome Plantarum,*" 1675; Plumier's "*Description des Plantes de L'Amerique,*" 1693, first edition; two titles by John Ray, "*Observations, Topographical, Moral and Physiological,* 1673, and "*Methodus Plantarum Nova,*" 1682.

We received in exchange from the Michigan State Board of Agriculture 18 volumes of their *Annual Report,* beginning with 1888. The Wisconsin Academy of Sciences, Arts and Letters forwarded us 28 volumes of their *Transactions.*

We now have a total of 6,500 volumes and 4,778 pamphlets.

In rewriting the pamphlet catalog the title page of each pamphlet was compared with its old card. In this way an inventory was taken of the entire pamphlet collection. The difference between the number of pamphlets here given and the old figures is due to the fact that publications counted by us as "parts of publications," such as Bulletins, were included prior to 1916 in the pamphlet collection. This error has now been rectified.

Periodicals

Sixty-four new titles have been added to the current periodical file, fifty-two of which are received in exchange. The total number of current periodicals now received in the library is 453. In this way 5,454 parts of publications were received and prepared for the shelves during the year.

Nine state departments of agriculture and twenty-one extension divisions of agricultural experiment stations have been added to the exchange list.

Among the new titles are the *Annales of the Jardin botanique,* Buitenzorg; *Ecology; The Florida Entomologist; The Flower*

Grower; Flowering Plants of South Africa; The Garden, London; *Genetica; Bulletin* de la Société Botanique de Genève; *Gentes Herbarum; Hedwigia; Journal of Indian Botany; Marcellia; Bulletin,* Massachusetts Horticultural Society; *Metron; Minnesota Horticulturist; Agricultural Gazette of New South Wales;* Linnean Society of New South Wales, *Proceedings; Proceedings* of the Northern Nut Growers Association; the *Bulletin* and *Memoires* of the Société Portugaise des Sciences Naturelles; *School Science Review; Verhandlungen* and *Neue Denkschriften* of the Schweizerische Naturforschenden Gesellschaft; *Scottish Journal of Agriculture; Journal* of the Société Nationale d'Horticulture de France; *Southwest Science Bulletin; Tijdschrift over Plantenziekten.*

Loans

Twenty-five publications were loaned to the following institutions: The Brooklyn Museum; Carnegie Institution of Washington; Dept. of Experimental Evolution, Cold Spring Harbor, L. I.; Columbia University; Eugenics Record Office, Cold Spring Harbor, L. I.; Indiana University, Bloomington, Ind.; Thomas A. Edison Industries, Orange, N. J.

The usual collection of books was forwarded to the Biological Laboratory at Cold Spring Harbor, for their summer session.

We wish to extend our appreciation of the loans made us by the Brooklyn Museum Library, the Brooklyn Public Library and the Library of Congress.

Binding

During the year 256 volumes were forwarded to the binder in two shipments; these were mainly completed volumes of periodicals. We could easily send as many more from our book collection as well as from the remaining volumes of completed serials, if funds were available.

Miscellaneous

The Junior Class of the Library School of the New York Public Library, conducted by Miss E. W. Tiemann, visited the Garden September 24. The librarian gave a talk on the methods

used in the organization and work of the Brooklyn Botanic Garden Library and the arrangement of catalogs and vertical files. Tea was served in Room 330, and the director and curator of elementary instruction spoke of the work of the Botanic Garden. The class was then taken over the grounds by Dr. Gundersen.

Special mention may be made of the use made of the library resources by the class of ex-soldiers sent by the U. S. Federal Board of Vocational Education for our course for the training of gardeners. Special books have been set aside for these students, and care has been taken to give them all the assistance required in their courses of study. Special publications have been provided in duplicate by the Federal Board for the use of these students.

Summary

About 100 publications, the remainder of the Griffiths' collection purchased in 1919, were prepared for use and incorporated with our collection.

Pamphlet catalog cards to the number of 4,626 have been rewritten on cards uniform in size with the cards in the dictionary catalog, 7.5 cm. by 12.5 cm. We shall thus have one dictionary catalog for the entire collection, including books, pamphlets, and serial publications. This was impossible until the present time, due to the fact that prior to 1916 pamphelts had been entered on cards of smaller size, 5 cm. by 12.5 cm.

An inventory of the pamphlet collection was taken in order to ascertain the exact number in the library.

New lists of scientific societies and publications were prepared with a view to enlarging the exchange list. In this way sixty-four new exchanges have been added.

The serial publications have been shelf-listed and cataloged through the Ne's.

The library was represented at the meetings of the New York Library Club and the New York Special Library Association.

1921

The large task for the coming year is the completion of the serial shelf list and catalog.

The 4,626 rewritten pamphlet cards will be revised and filed into the dictionary catalog.

It is to be hoped that financial matters may be so arranged that the library will be enabled to send books and periodicals twice a year to the bindery. In this way we shall make it easier for the staff to consult periodical publications and insure the life of the publication for a longer period.

At the present time the only list of exchanges is in the business office. We hope, during the coming year, to complete a file of these exchanges for use in the library.

For list of donors and gifts see Appendix I.

The statistical report follows:

STATISTICAL REPORT ON THE LIBRARY

Accessions

	Volumes	Pamphlets	Parts (Including Periodicals)
Exchange	180	83	2,976
Gift	48	405	1,656
Publication	2	48	133
Purchase	230	1	682
Deposit	0	0	7
Total	460	537	5,454

Total number of parts of publications added to the library in 1920, including current periodicals	5,454
Total number of volumes in library December 31, 1919	6,040
Total number of volumes added during 1920	460
Total number of volumes in library December 31, 1920	6,500
Total number of pamphlets in library December 31, 1920	4,778
Total number of volumes and pamphlets in library December 31, 1920	11,278

Serial Publications

Count of Periodicals, State and Federal Documents, and Society Publications Currently Received During 1920:

Subscription	54
Gift	49
Exchange	342
Deposit from Brooklyn Public Library	2
Publication	6
Total	453
Increase	64

Miscellaneous Statistics

Torrey Botanical Club index cards on file in the library, December 31, 1919	27,756
Torrey Botanical Club index cards added by purchase during 1920	1,198
Total number of Torrey Botanical Club index cards on file December 31, 1920	28,954
Index Algarum Universalis cards, December 31, 1919	9,899
Added by purchase during 1920	1,650
Total, Index Algarum Universalis cards, December 31, 1920	11,549
Cards added to shelf list	685
Cards added to dictionary catalog	1,560
Cards added to pamphlet catolog	5,086
Cards added to current periodical catalog	68
Cards added to catalog of duplicates	92
Total, typewritten cards	7,491
Books loaned to members of staff	706
Number of readers in library, approximately	1,403
Volumes entered in accession book	460
Number of letters written	382
Books loaned to other institutions	25
Books borrowed from other institutions	11
Lantern slides on file December 31, 1919	2,674
Lantern slides accessioned during 1920	110
Total number of lantern slides on file December 31, 1920	2,784
Photographic negatives on file December 31, 1919	3,352
Negatives accessioned during 1920	243
Total number of negatives on file December 31, 1920	3,595

Respectfully submitted,

RAY SIMPSON,

Librarian.

FINANCIAL STATEMENTS FOR 1920

I. Maintenance Account

1360 *Personal Service*

Appropriation as of January 1, 1920	$47,688.00
Appropriation as of August 20, 1920	3,478.33
	$51,166.33
Expended	50,898.14
Balance, December 31, 1920	$ 268.19

1361 *Other Codes than Personal Service*

Line 1	*Fuel Supplies*		
	Appropriation		$ 5,440.28
	Transferred from 1361–4		34.95
			$ 5,475.23
	Expended		5,475.23
Line 2	*Office Supplies*		
	Appropriation		$ 312.82
	Transferred from 1361–4		71.70
			$ 384.52
	Expended		384.52
Line 3	*Laundry, Cleaning and Disinfecting Supplies:*		
	Appropriations		$ 60.45
	Transferred from 1361–4		7.35
			$ 67.80
	Expended		67.80
Line 4	*Botanical and Agricultural Supplies:*		
	Appropriation		$ 5,383.61
	Expended	$4,878.41	
	Transferred to 1361–1	$ 34.95	
	Transferred to 1361–2	71.70	
	Transferred to 1361–3	7.35	
	Transferred to 1361–5	32.96	
	Transferred to 1361–6	2.64	
	Transferred to 1361–11	7.55	
	Transferred to 1361–12	348.05	505.20
			5,383.61
Line 5	*General Plant Supplies*		
	Appropriation		117.12
	Transferred from 1361–4		32.96
			$ 150.08
	Expended		150.08
Line 6	*Wearing Apparel*		
	Appropriation		$ 6.04
	Transferred from 1361–4		2.64
			$ 8.68
	Expended		8.68
Line 7	*Office Equipment*		
	Appropriation		$ 313.76
	Transferred from 1361–8	$ 131.50	
	Transferred from 1361–9	47.96	
	Transferred from 1361–10	113.80	293.26
			$ 607.02
	Expended		607.02

Line 8	*General Plant Equipment*			
	Appropriation			$ 1,651.47
	Expended		$1,519.97	
	Transferred to 1361–7		131.50	1,651.47
Line 9	*General Plant Materials*			
	Appropriation			$ 1,114.50
	Expended		$1,066.54	
	Transferred to 1361–7		47.96	1,114.50
Line 10	*General Repairs and Replacements*			
	Appropriation			$ 929.38
	Expended		$ 619.01	
	Transferred to 1361–7	$113.80		
	Transferred to 1361–11	82.84		
	Transferred to 1361–16	13.72		
	Transferred to 1361–17	100.01	310.37	929.38
Line 11	*Light, Heat and Power*			
	Appropriation			$ 143.45
	Transferred from 1361–4		$ 7.55	
	Transferred from 1361–10		82.84	90.39
				$ 233.84
	Expended			233.84
Line 12	*General Plant Service*			
	Appropriation			$ 347.57
	Transferred from 1361–4			348.05
				$ 695.62
	Expended			695.62
Line 13	*Hire of Horses and Vehicles with Drivers*			
	Appropriation			$ 680.04
	Expended		$ 649.00	
	Transferred to 1361–17		31.04	680.04
Line 14	*Hire of Horses and Vehicles without Drivers*			
	Appropriation			$ 75.56
	Expended		$ 42.00	
	Transferred to 1361–17		33.56	75.56
Line 15	*Telephone Service*			
	Appropriation			$ 169.25
	Expended		$ 160.44	
	Transferred to 1361–17		8.81	169.25
Line 16	*Carfares*			
	Appropriation			$ 37.78
	Transferred from 1361–10			13.72
				$ 51.50
	Expended			51.50

Line 17	*Express and Deliveries*		
	Appropriation		$ 226.68
	Transferred from 1361–10	$ 100.01	
	Transferred from 1361–13	31.04	
	Transferred from 1361–14	33.56	
	Transferred from 1361–15	8.81	
	Transferred from 1361–18	9.08	182.50
			$ 409.18
	Expended		409.18
Line 18	*Contingencies*		
	Appropriation		$ 302.24
	Expended	$ 293.16	
	Transferred to 1361–17	9.08	302.24
Summary of Maintenance Accounts:			
	Appropriation by City for maintenance		$65,000.00
	Expended		65,000.00
	Appropriation as of August 20, 1920		$ 3,478.33
	Expended		3,210.14
	Balance, December 31, 1920		$ 268.19

II. Private Funds Accounts

1. *Endowment Fund* ($75,000.00) (*Restricted in part*):

	Income Account:		
	Income, 1920		$ 3,750.00
	Expended	$3,572.74	
	Transferred to Special Contributions	177.26	3,750.00

2. *Life Membership Fund* ($3,500.00) (*Restricted*):

	Income Account:		
	Income, 1920		$ 156.25
	Expended		57.71
	Balance, December 31, 1920		$ 98.54

3. *George C. Brackett Library Fund* ($500.00) (*Restricted*):

	Income Account:		
	Balance, January 1, 1920		$ 65.43
	Income, 1920		25.00
			$ 90.43
	Expended		42.87
	Balance, December 31, 1920		$ 47.56

4. *Benjamin Stuart Gager Memorial Fund* ($10,000.00) (*Restricted*):

	Income Account:		
	Balance, January 1, 1920		$ 526.60

Income, 1920		800.00
		$ 1,326.60
Expended		823.87
Balance, December 31, 1920		$ 502.73

5. *Martha Woodward Stutzer Memorial Fund* ($5,000.00) (*Restricted*):

Income Account:

Balance, January 1, 1920		$ 250.00
Income, 1920		187.50
		$ 437.50
Expended		376.05
Balance, December 31, 1920		$ 61.45

6. *Mary Bates Spalding Fund* ($930.00) (*Restricted*):

Income Account:

Income, 1920		$ 50.00
Expended		0.00
Balance, December 31, 1920		$ 50.00

7. *Cary Library Fund* ($10,000.00; ⅓ to B.B.G.) (*Restricted*):

Income Account:

Balance, January 1, 1920		$ 25.41
Income, 1920		100.00
		$ 125.41
Expended		122.24
Balance, December 31, 1920		$ 3.17

8. *Special Fund* (*Restricted*) (Brooklyn Institute Endowment Allotment):

Income Account:

Income, 1920		$ 3,315.00
Expended	$2,034.81	
Transferred to Special Contributions	1,280.19	3,315.00

9. *Botanic Garden Collections Fund, 1920* (*Restricted*):

Transferred from Collections Fund, 1919		$ 1,191.97
Received from contributions, 1920		11,939.70
		13,131.67
Expended	$3,596.35	
Transferred to Special Contributions	9,321.31	12,917.66
Balance, December 31, 1920		$ 214.01

10. *Sustaining Membership* (*Restricted*):

Balance, January 1, 1920		$ 77.03
Received from dues, 1920		376.87
		$ 453.90
Expended		$ 399.76
Balance, December 31, 1920		$ 54.14

11. *Annual Membership (Restricted):*

Balance, January 1, 1920		$ 5.47
Received from dues, 1920		1,240.00
		$ 1,245.47
Expended		1,210.82
Balance, December 31, 1920		$ 34.65

12. *Tuition and Sales (Restricted):*

Balance, January 1, 1920		$ 1,834.00
Received, 1920:		
(*a*) Instruction	$1,097.82	
(*b*) Penny seed-packets	2,570.81	
(*c*) Incidentals	364.83	4,033.46
		$ 5,867.54
Expended		3,732.71
Balance, December 31, 1920		$ 2,134.83

13. *Special Purposes* (*Restricted* by terms of gift):

Special gifts for Conservatory Garden, Children's Room, and Prizes for Children's Gardens:	
Received	$ 6,023.08
Expended	6,023.08

14. *Special Contributions* (For 1920 only):

Received from contributions	$ 2,050.00
Transferred from Collections, 1920	9,321.31
Transferred from Endowment Fund	177.26
Transferred from Special Fund	1,280.19
	$12,828.76
Expended	12,828.76

Summary of Private Funds Accounts:

Balance, January 1, 1920			$ 3,975.99
Income, 1920:			
Restricted:			
Life Membership Fund	$ 156.25		
Brackett Library Fund	25.00		
Gager Memorial Fund	800.00		
Stutzer Memorial Fund	187.50		
Mary Bates Spalding Fund	50.00		
Cary Library Fund	100.00		
Special Fund	3,315.00		
Collections Fund	11,939.70		
Sustaining Membership	376.87		
Annual Membership	1,240.00		
Tuition and Sales	4,033.46		
Special Purposes	6,023.08		$28,246.86

Restricted in part:			
Endowment Fund	$ 3,750.00		
Special Contributions ...	2,050.00	5,800.00	34,046.86
			$38,022.85
Expended			34,821.77
Balance, December 31, 1920.....			$ 3,201.08

APPROPRIATIONS OF CORPORATE STOCK AND TAX NOTES OF THE CITY OF NEW YORK FOR PERMANENT IMPROVEMENTS, AND EXPENDITURES THEREFROM DURING 1920

C.D.P. 200-M *($100,000.00) For Improvement of the Brooklyn Botanic Garden*

Balance, January 1, 1920	$	12.51
Expended		12.51

S.-566 *($100,000.00) Suspense Account, Contributions for Brooklyn Botanic Garden Improvement Fund*

Balance, January 1, 1920	$	94.82
Expended		94.82

C.D.P. 200-R *($6,598.00) For Extension of Underground Coal Cellar of Brooklyn Botanic Garden*

Appropriated July 18, 1919 (Tax Notes).....		$5,000.00	
Appropriated May 7, 1920 (Tax Notes).....		1,598.00	
For cost of work.....	$6,348.00		
For Inspector (2 mos. @ $1,500 a yr.)	250.00		$ 6,598.00
Expended			107.55
Balance, December 31, 1920.....			$ 6,490.45

APPENDIX 1

GIFTS RECEIVED DURING 1920

Collections Fund

Mrs. John Anderson	William C. Ferguson	A. W. Jenkins
E. Addie Austin	John W. Frothingham	E. R. Kennedy
Samuel P. Avery	A. Augustus Healy	Florence E. Longstreet
Frank L. Babbott	Gustav Heubach	Mrs. John Bradley Lord
Mrs. E. R. Coker	Mr. & Mrs. James Hills	H. J. Morse
Walter H. Crittenden	Mrs. John Hills	Adolph Muller
J. D. Dettmer	Charles H. Irvin	Henry F. Noyes

George D. Pratt
William A. Putnam
Mrs. William A. Putnam
Walter B. Seymour
F. H. Sloan
Harold Somers
Mrs. Daniel Somers
Herman Stutzer
Clifford S. Trotter
Mrs. E. F. Uhrbrock
Mary Van Norden
Mary H. Westbrook
The Misses White
Alfred T. White
Mary B. Woodward

Total subscriptions, 1920 ..... $11,939.70

Prizes

Mr. Alfred T. White, as follows:

War Savings Stamps (14)	$ 58.66
Thrift Stamps (200)	50.00
Silver cups (4)	52.82
Silver medals (8)	24.08
Bronze medals (50)	68.00
Bronze and gold medals (41)	62.95
The Alfred T. White scholarship	100.00
Total	$416.51

Living Plants

Andorra Nurseries, through
American Iris Society
(31 Japanese Iris)
Mr. Willard J. Bixby
(12 varieties of nut trees)
Dr. William Browning (2)
John Lewis Childs, through
American Iris Society
(46 Japanese Iris)
Elm City Nurseries, through
American Iris Society
(25 Japanese Iris)
Mrs. M. S. Hall (1)
A. E. Hyde (6)
Mrs. C. L. Hyde (5)
Mr. William Keller (1)
Miss Emma Loines (1)
Mrs. T. C. Morgan (3 bulbs)
E. L. Morrell (10)
Mrs. F. Rambusch (1)
Prof. W. W. Rowlee,
Cornell University (1)
Smith College (1)

Total, 145

Herbarium (Phanerogamic)

Miss Margaret Armstrong,
48 specimens from the southwestern United States.

Mrs. W. H. Cary,
(2) *Lysimachia terrestris*, and *Aethusa Cynapium* from New Canaan, Conn.

Mr. G. P. Engelhardt,
(1) *Chrysoma pauciflosculosa* from Daphne, Baldwin County, Alabama, collected by Dr. Thomas Van Allen.

Miss E. M. Kittredge,
3 ferns from North Ferrisburg, Vt.

Mr. Alfred T. White,
(2) *Rhododendron maximum* from St. Huberts, Essex County, N. Y.

Miss Louise Zemansky,
100 miscellaneous specimens (for teaching collection).

Total, 156.

Library

Books

American Scenic and Historic Preservation Society	1
Mr. M. J. Averill	2
Dr. Mathilde Bensaude	1
Mr. H. L. Bridgman	1
Mrs. N. L. Britton	1
Brooklyn Public Library, Reference Department	1
Mr. Lorentz Cantor	1
Cornell University	1
Dr. C. S. Gager	16
Hon. John B. Johnston	3
Metropolitan Park Commission	1
New Hampshire, Dept. of Agriculture	1
New York State Museum	3
Miss Ellen Eddy Shaw	1
Mrs. Annie Morrill Smith	2
Mr. Alfred T. White	1
Wisconsin Academy of Sciences, Arts and Letters	11
Total	48

Pamphlets

Dr. C. E. Allen	12
Dr. S. C. Brooks	4
Dr. G. S. Bryan	2
Prof. D. H. Campbell	35
Carnegie Institution of Washington	9
Prof. M. A. Chrysler	17
Dr. G. N. Collins	11
Cornell University	85
Prof. J. J. Davis	3
Prof. R. H. Denniston	2
Prof. O. A. Farwell	2
Prof. Margaret C. Ferguson	1
Prof. Bruce Fink	5
Mr. Montague Free	1
Dr. C. S. Gager	81
Prof. C. W. Hargitt	1
Mr. A. D. Little	1
National Research Council	1
New York State College of Forestry	1
Newark, N. J., Dept. of Parks and Public Property	2
Prof. C. R. Orton	7
Prof. W. J. V. Osterhout	24
Prof. L. H. Pammel	79
Rockefeller Foundation	1
Prof. W. W. Rowlee	1
Dr. F. J. Seaver	1
Dr. J. K. Small	3
U. S. School Garden Army	9
Mr. Alfred T. White	4
Total	405

Parts of Publications Exclusive of Government Publications

American Peony Society	1
American Plant Pest Committee	1
Prof. L. H. Bailey	1
Carnegie Institution of Washington	1

Columbia University	13
Mr. E. Durant	1
Mr. Montague Free	12
Dr. C. S. Gager	69
Prof. J. W. Hoton	1
Mr. Charles W. Hungerford	1
Illinois State Laboratory of Natural History	1
Massachusetts State Forester	1
National Research Council	2
New England Federation of Natural History Societies	1
New York Academy of Sciences	2
New York City Dept. of Health	64
Newark, N. J., Dept. of Parks and Public Property	18
Dr. E. W. Olive	10
Prof. C. R. Orton	4
Pan-Pacific Scientific Conference	1
Rockefeller Foundation	1
Save the Redwoods League	1
Miss Ellen Eddy Shaw	13
Mrs. Annie Morrill Smith	21
Mr. Norman Taylor	2
Mr. Alfred T. White	1
The Misses White	10
Dr. O. E. White	1
Mr. W. A. White	1
Wisconsin Academy of Sciences, Arts and Letters	2
Wisconsin Geological and Natural History Survey	1
Zeitschrift für Garten und Obstbau	10
Total	269

For Elementary Instruction

Gissel, Anna M., $10.

Goosch, Harriet, One marsh hawk mounted.

Hammond, Benjamin, $5.

Mothers' Club, Model School, $15

Mothers' Club, P. S. 85, $5.

Steeves, Edward Everett, One copper bowl.

Teachers' Class (1920), Brooklyn Botanic Garden, One brass tea tray

APPENDIX 2

PUBLICATIONS OF MEMBERS OF STAFF DURING 1920

Caparn, Harold A.

—— Statuary in the Small Garden. *House and Garden* **37**: 26–29. 20 June.

—— Economising on Trained Brains. *Landscape Architecture* **10**: 137–141. April.

Chapin, Margaret

—— Families of Useful Plants. *Brooklyn Bot. Gard. Leaflets,* **VIII**[10]. October.

Free, Montague

—— Care of the lawn. *Brooklyn Bot. Gard. Leaflets,* **VIII**[9]. June 2.

—— Things and thoughts of the garden. Monthly articles in *Gardeners' Chronicle of America.* July to December inclusive.

Gager, C. Stuart

—— Prospects for a new national botanic garden. *Brooklyn Bot. Gard. Rec.* 9: 20–22. Jan.

—— Ninth annual report of the Brooklyn Botanic Garden, 1919. Report of the Director. *Brooklyn Bot. Gard. Rec.* 9: 29–54. April.

—— Heredity and evolution in plants. Pp. xx + 265. Figs. 113. Philadelphia, P. Blakiston's Son & Co. August.

—— Various abstracts of botanical papers in *Bot. Absts.* **3–6.**

—— **and A. Gundersen.** The Brooklyn Botanic Garden Collection of portraits of botanists. *Brooklyn Bot. Gard. Leaflets,* **VIII**[6–8]. May 5.

Gundersen, Alfred

—— Plant Families: A Plea for an International Sequence. *New Phytologist* **19**: 264–271. December.

—— Small's Origin and Evolution of the Compositae. (Review.) *Torreya* **20**: 125–126. December.

—— Various abstracts in *Botanical Abstracts* **3–4.**

—— **and C. Stuart Gager.** The Brooklyn Botanic Garden Collection of Portraits of Botanists. *Brooklyn Bot. Gard. Leaflets,* **VIII**[6–8]. May 5.

Olive, Edgar W.

—— Report of the Curator of Public Instruction for 1919. *Brooklyn Bot. Gard. Rec.* 9: 60–64. April.

—— Various abstracts of botanical papers in *Bot. Absts.* **3–6.**

Shaw, Ellen Eddy

—— Nature Aids to Garden Work. *Nature Study Review* **16**[3]. March.

—— Report of the Curator of Elementary Instruction for 1920. *Brooklyn Bot. Gard. Record* 9: 64–69. Apr.

—— Real Tests. *Brooklyn Bot. Gard. Leaflets,* **VIII**[1]. Apr. 7.

—— Seventh Annual Garden Exhibit for Brooklyn Boys and Girls. *Brooklyn Bot. Gard. Leaflets,* **VIII**[2]. Apr. 14.

Simpson, Ray

—— Report of the Librarian for 1919. *Brooklyn Bot. Gard. Record* 9: 69–75. April.

Stoll, Frank

—— Some pioneer handicraft. Hickory withes. *Totem Board of the Woodcraft League of America*, **III**[5]. February.

—— The chain of hickory withes. *Totem Board,* **III**[6]. March.

—— How to make a rope. *Totem Board,* **IV**[3]. September.

—— Pellett's American honey plants. (Review.) *Torreya* **20**: 104.

Taylor, N.

—— Murrill's Nature Books. (Review.) *Torreya* **20**: 11, 12. February.

—— Report of the Curator of Plants. *Brooklyn Bot. Gard. Record* 9: 54–60. April.

—— The Cactaceae by N. L. Britton and J. N. Rose. (Review.) *Journ. Int. Garden Club* **3**: 643. December, 1919. June.

—— The Garden Record Book by Harriet P. Thompson. (Review.) *Journ. Int. Garden Club* **3**: 645. (December, 1919.) June.

—— A Rare Palm from Cuba in the Conservatories. *Brooklyn Bot. Gard. Record* 9: 101, 102. July.

—— Effects of the Winter of 1919–1920 on the Woody Plants in the Garden. *Brooklyn Bot. Gard. Record* 9: 121–123. October.

—— **and Adams, C. C.; Burns, G. P.; Hankinson, T. L.; Moore, Barrington.** Plants and Animals of Mount Marcy, New York. *Ecology* 1: 71–94, 204–233, 274–288. (Reprinted as *Contributions Brooklyn Bot. Gard. No. 24.* December.)

White, Orland, E.

—— Numerous abstracts. Genetic department of *Botanical Abstracts* **3–5**.

—— East's and Jones' Inbreeding and Outbreeding. (Review.) *The New Republic* **24**: 278–280. November.

—— East's and Jones' Inbreeding and Outbreeding. (Review.) *Torreya* **20**: 32–34. March–April.

—— The Ancient History of Plants. *Brooklyn Bot. Gard. Leaflets,* **VIII**[3-5]. April 28. Revised reprint of *B. B. G. Leaflets.* **IV**[14] (1916).

APPENDIX 3

PUBLIC LECTURES, ADDRESSES, AND PAPERS GIVEN BY MEMBERS OF STAFF DURING 1920

By the Director of the Garden:

Oct. 7. *How the Brooklyn Institute Department of Botany and the Botanic Garden may be mutually more helpful.* Science Room, B. I. A. A.

Nov. 4. *The Organization and Work of the Brooklyn Botanic Garden.* Before the Brooklyn Colony of New England Women, Brooklyn Woman's Club.

By the Curator of Plants:

March 17. *The flora of Mt. Marcy above timber line.* Torrey Botanical Club.

April 22. *Wild flowers within motoring distance of New York.* Brooklyn Botanic Garden.

June 19. *New York as a centre for the amateur botanist.* New York Botanical Garden.

July 9. *Wild flowers worth cultivating.* Greenwich Garden Club.

September 26. *How plants get their food.* New York Botanical Garden.

December 28. (With Major Barrington Moore.) *Plant composition and soil acidity of a Maine bog.* Ecological Society of America.

December 30. *Endemism in the Bahama flora.* Botanical Society of America.

By the Curator of Plant Breeding:

February 27. *The genetic constitution of peas.* Staff seminar, Station for Experimental Evolution at Cold Spring Harbor, L. I., N. Y.

October 21. *Variation, environment and the laws of heredity.* Girls' biology class of Manual Training High School, at the Brooklyn Botanic Garden.

By the Curator of Elementary Instruction:

January 29. *Graduation Address.* P. S. No. 119.
February 2. *The small vegetable garden.* Larchmont Garden Club.
February 6. *What the Brooklyn Botanic Garden is doing for Brooklyn's children.* Friday Afternoon Club.
February 18. *Nature study in the classroom.* Hunter College.
February 26. *A plant breakfast.* Assembly, P. S. No. 139.
March 1. *The soil.* Larchmont Garden Club .
March 2. *Women's opportunities in agriculture.* Woman's Farm & Garden Association.
March 3. *Nature study in the streets and parks.* Hunter College.
March 17. *Gardening.* Hunter College.
March 18. *Plant life.* Mothers' Club, P. S. No. 51, Queens.
March 19. *Plant life.* Mothers' Club, P. S. No. 56, Queens.
April 8. *Plant life.* Mothers' Club, P. S. No. 66, Queens.
April 13. *Trees.* Assembly, P. S. No. 165.
April 19. *Trees.* Assembly, P. S. No. 108.
April 22. *Plant life.* Mothers' Club, P. S. No. 97, Queens.
April 26. *The Brooklyn Botanic Garden.* Woodmere School.
April 27. *School gardens.* Assembly, P. S. No. 108.
April 27. *Vegetable gardening.* Mothers' Club, P. S. No. 127.
April 28. *Vegetable gardening.* Assembly, P. S. No. 16.
October 13. *Bulbs and house plants.* Mothers' Club, P. S. No. 70.
November 16. *What the Brooklyn Botanic Garden is doing for Brooklyn's children.* Kings Highway Congregational Church.
November 17. *Nature and the Thanksgiving festival.* Assembly, P. S. No. 81, Queens.
November 19. *A New England Thanksgiving.* Manual Training H. S. Annex.
December 13. *Our flowers in winter.* Assembly, Girls' High School.
December 24. *The Christmas festival.* Two assemblies, P. S. No. 36.

December 28. *A survey of twenty years' progress in nature study in providing materials for study.* University of Chicago, Nature Study Meeting.

By the Associate Curator of Plants:

February 25. *Labels and Records for Herbaceous Plants.* Before the Torrey Botanical Club.

December 29. *Relationships of Families of Dicotyledons.* Before the Systematic Section, Botanical Society of America, in Chicago.

By the Librarian:

Sept. 24. *Methods used in the work of the library of the Brooklyn Botanic Garden.* Junior Class, Library School, New York Public Library, at the Botanic Garden.

By the Horticulturist and Head Gardener:

February 12. *Rock gardens.* Landscape Art Dept., N. Y. State College of Agriculture, Ithaca.

April 8. *Alpine and rock plants.* Brooklyn Botanic Garden.

May 31. *Plant propagation.* Women's Club, Great Neck, L. I.

September 14. *Rock gardens.* National Association of Gardeners, St. Louis, Mo.

APPENDIX 4

MEETINGS OF ORGANIZATIONS AND SOCIETIES AT THE GARDEN, 1920

March 17. Torrey Botanical Club.
May 3. Woodcraft League, Wamponomon Tribe.
May 10. Executives of the Central Branch Y. M. C. A. of Brooklyn.
May 14. Flatbush Garden League.
May 20. Inkowa Club.
May 27. Mothers' Club, P. S. 178.
May 27. Mothers' Club, P. S. 106.
May 28. Flatbush Garden League.
June 2. Mothers' Club, P. S. 124.
June 5. Chamber of Commerce of Brooklyn.
June 7. Woodcraft League, Wamponomon Tribe.
June 8. Mothers' Club, P. S. 72.

June 11. Flatbush Garden League.
June 12. Neighbors' Day.
June 14. Mothers' Club of the Gowanus Canal Children's Garden.
July 9. Flatbush Garden League.
October 5. Woodcraft League, Wamponomon Tribe.
October 31. Inkowa Club.
November 19. Flatbush Garden League.
Total, 19.

APPENDIX 5

FIELD TRIPS AND TALKS

By the Associate Curator of Plants:

April 17. Torrey Botanical Club, Brooklyn Botanic Garden.
October 16. Brooklyn Institute Department Botany, Valley Stream, L. I.

By the Registrar and Custodian:

January 4. Identification of trees, in Prospect Park, for Boy Scouts.
February 1. Identification of trees, in Prospect Park, for Boy Scouts.
March 7. Identification of trees, in Prospect Park, for Boy Scouts.
April 4. Identification of trees, in Prospect Park, for Boy Scouts.
May 2. Identification of trees, in Prospect Park, for Boy Scouts.
May 3. Trees, Shrubs and Wild Flowers. Woodcraft League. Brooklyn Botanic Garden.
June 6. Identification of trees, in Prospect Park, for Boy Scouts.
June 7. The Brooklyn Botanic Garden. Woodcraft League, Wamponomon Tribe of Brooklyn. Iris Garden.
October 3. Identification of trees, in Prospect Park, for Boy Scouts.
October 31. Honey Bees. Inkowa Club. Brooklyn Botanic Garden.

November 7. Identification of trees, in Prospect Park, for Boy Scouts.

December 5. Identification of trees, in Prospect Park, for Boy Scouts.

APPENDIX 6

AGREEMENT BETWEEN THE ECOLOGICAL SOCIETY OF AMERICA AND THE BROOKLYN BOTANIC GARDEN CONCERNING THE PUBLICATION OF THE JOURNAL "ECOLOGY"

WHEREAS, the Ecological Society of America, recognizing the lack of adequate provision in the United States for publishing the results of research, and for diffusing information, in the general subject of ecology, desires to establish and publish a new journal for this purpose, and

WHEREAS, the Brooklyn Botanic Garden, organized for the advancement and diffusion of a knowledge and love of plants, desires to cooperate with the Ecological Society of America in the publication of the proposed journal, it is, therefore, mutually agreed between the Ecological Society and the Botanic Garden as follows:

1. The monthly journal now known as the *Plant World* shall be acquired and taken over by the Ecological Society according to such terms as it may agree upon with the Plant World Association.

2. The Brooklyn Botanic Garden shall assume no obligations and shall incur no responsibility as between the Plant World Association and the Ecological Society, and the Ecological Society of America hereby absolves the Brooklyn Botanic Garden from all such responsibility and obligations.

3. The name "*Plant World*" shall be discontinued as the major title of the new journal.

4. The new journal shall be called *Ecology*.

5. Underneath the name Ecology, on the front page of the cover of each issue and elsewhere in the publication as may be subsequently agreed upon, shall be printed the following statements, or statements substantially equivalent thereto.

Continuing the Plant World
Official Organ of the
Ecological Society of America

6. At or near the bottom of the front page of the cover of the journal, and elsewhere as may subsequently be agreed upon, shall appear the following statement of publication:

Published
In Cooperation with the Ecological Society of America
by the
Brooklyn Botanic Garden
at
(Address of the Printers)

7. The Business Manager of the journal shall be the Brooklyn Botanic Garden, or such officer or member of staff as the Director of the Garden may from time to time designate.

8. Advertisements may be carried on the third and fourth pages of the cover, and on inside pages additional to those containing reading matter. The advertisements shall be of a character acceptable to both the Ecological Society and the Botanic Garden.

9. The second page of the cover shall be reserved for editorial and business announcements of the journal.

10. No charge is to be made to the Ecological Society for the storage of undistributed copies of the journal at the Brooklyn Botanic Garden, but if it becomes necessary to pay rental or insurance for storage accommodations outside the Botanic Garden Buildings such rental shall become a charge against the account of the journal.

11. All publications received in exchange for the journal shall be deposited in the library of the Brooklyn Botanic Garden, and shall become the permanent property of the Garden, and shall become subject to the regulations governing the administration of the library.

12. If, and whenever, at any time, the gross income of the journal, from all sources (including subscriptions, advertisements, the sale of back numbers and sets, and any subsidies or endowments), shall exceed the necessary expenses of publication, postage, stationery, office assistance, etc., the surplus, either as principal or as interest on the same, shall be applied to improving the

journal, either by increasing the number of pages, or the number or quality of the illustrations, or the quality of the paper, one or all, or in any other way, according as the editors and managements may jointly agree; and the payment of an honorarium to contributors should be kept in mind as an end to be attained at the earliest possible date consistent with maintaining the magazine at a reasonable degree of excellence.

13. That the editorial board, which shall control the general editorial policy, shall (with the exception of one member who may be appointed by the Brooklyn Botanic Garden, at its option, in addition to the business manager) be elected or appointed by the Ecological Society of America under such terms and conditions, and at such periods as said Society may formally determine.

14. The frequency of publication, and the number of pages per issue, shall be as mutually agreed upon from time to time by the editorial board and the business manager.

15. The Ecological Society of America agrees to advance a sum of not less than one hundred dollars ($100) to meet necessary initial expenses, and to assign annually a portion of the annual membership dues of each memeber, to an amount of not less than two dollars per member, as a subscription to the journal to be paid by the treasurer of the Ecological Society to the business manager of the journal. These payments are to be made from time to time with reasonable promptness as the membership dues are received by the treasurer of the Society. Payment is to be made for members in arrears for dues unless and until the business manager is notified by the treasurer of the Society to remove from the mailing list of the journal the name or names of those in arrears for dues.

16. All members of the Ecological Society in good standing shall receive one copy of each issue of the journal without any payment in addition to the membership dues in the Society.

17. The fiscal year of the journal shall end on November 30; and the business manager shall render an annual financial statement to the Ecological Society of America at the time and place of its annual meeting.

18. The Brooklyn Botanic Garden agrees to become responsible for any annual deficit not to exceed Three Hundred Dol-

lars ($300) a year. In consideration of this provision the choice of printer and the drawing of all contracts for printing and illustrating shall rest with the business management, and no expenses shall be incurred in the name of or on behalf of the journal except by or with the approval of the business manager.

19. This agreement shall remain in force for not less than three years from date (January 1, 1920), and may be terminated by either party only after written notice of intention to terminate shall have been given to the proper official at least one year in advance.

20. In case, and when, this agreement shall terminate, the Ecological Society of America shall have possession of all over copies of the journal and of the mailing lists, and shall have the right to the name of the journal; but the Brooklyn Botanic Garden shall retain ownership of the exchanges already received, and of such numbers of incomplete volumes of exchanges as are necessary to complete current volumes.

For the Ecological Society of America:

(Signed) BARRINGTON MOORE,

(Signed) CHAS. C. ADAMS.

For the Brooklyn Botanic Garden:

(Signed) C. STUART GAGER.

BROOKLYN, NEW YORK,
January 1, 1920.

The Brooklyn Institute of Arts and Sciences

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OF THE
BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the *Annual Report* of the directors and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others one dollar a year; 25 cents a copy.

MEMOIRS. Established, July, 1918. Published irregularly. Volume I, *Dedication Papers:* comprising scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. Price $3.50, plus postage.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

12. *Endemism in the flora of the vicinity of New York.* 10 pages. 1916.

13. *The origin of new varieties of Nephrolepis by orthogenetic saltation. I. Progressive variations.* 28 pages, 6 plates. 1916.

14. *A white-cedar swamp at Merrick, Long Island, and its significance.* 10 pages, 5 plates. 1916.

15. *Present status of the problem of the effect of radium rays on plant life.* 8 pages. 1916.

16. *Flora of the vicinity of New York.* 6 pages, fig. 1. 1917.

17. *Endophyllum-like rusts of Porto Rico.* 9 pages, 3 plates. 1917.

18. *Inheritance of endosperm color in maize.* 11 pages. 1917.

19. *Studies of inheritance in Pisum. II. The present state of knowledge of heredity and variation in peas.* 102 pages. 1917.

20. *Inheritance studies in Pisum. III. The inheritance of height in peas.* 7 pages, fig. 1. 1918.

21. *A sketch of plant classification from Theophrastus to the present.* 16 pages. 1918.

22. *A basis for reconstructing botanical education.* 6 pages. 1919.

23. *Plant families: a plea for an international sequence.* 9 pages. 1920.

24. *Plants and animals of Mount Marcy, New York.* 69 pages, 1 plate, 22 figs. 1920.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

SEED LIST. Issued in December of each year.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in cooperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $6.00 a year.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $3.00 a year.

BROOKLYN BOTANIC GARDEN RECORD

VOL. X JULY, 1921 NO. 3

SEP 20 1921

IN MEMORIAM

ALFRED T. WHITE

FOR THE ADVANCEMENT OF BOTANY AND THE SERVICE OF THE CITY

PUBLISHED QUARTERLY

AT 41 NORTH QUEEN STREET

LANCASTER, PA.

BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

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THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN RECORD

VOL. X July, 1921 No. 3

ALFRED TREDWAY WHITE

To build the city is the great accomplishment, not to possess it.—*Emerson.*

On Saturday afternoon, January 29, 1921, the Brooklyn Botanic Garden met with its greatest possible loss. The "father" of the Garden, its greatest benefactor and staunchest friend, Alfred T. White, was drowned while skating on Forest Lake, near Central Valley, N. Y. There was something fine in the manner of his death. That a man seventy-five years of age should have been skating in the open country, like a boy, is an unusual thing; but it was not an unusual thing for this man. He was ever a man of action, in business, in philanthropy, in religious life, in recreation. In a way not common he was the embodiment of Browning's ideal of manhood:

"Oh, our manhood's prime vigor! No spirit feels waste,
Not a muscle is stopped in its playing nor sinew unbraced.
Oh, the wild joys of living! the leaping from rock up to rock,
How good is man's life the mere living! How fit to employ
All the heart and the soul and the senses forever in joy!"

With his residence on Brooklyn Heights and his office in Wall Street it had been his custom for many years to walk daily to and from his office, over the Brooklyn Bridge, a distance of

about two miles. I once expressed my surprise that he did not use his automobile more, and he replied that his systematic walking whenever time and distance permitted was one of the secrets of his good health.

I have referred to him as the father of the Brooklyn Botanic Garden, and this he was in a very real sense. The idea of a botanic garden in Brooklyn, so far as concerns the present institution, appears to have originated with Prof. Franklin W. Hooper, but the idea of having the Garden administered by the trustees of the Brooklyn Institute of Arts and Sciences was Mr. White's. It was he who secured, though he did not contribute, the initial endowment fund of $50,000 required by the City as a condition of entering into a cooperative arrangement with the Institute for the establishment of the Garden. It was he who, more than anyone else, appreciated the significance of more ambitious plans for the Garden than were at first contemplated.

It was he who came forward at every time of crisis or vital need to supply or secure the funds necessary to save the situation. When the projected plans for a Japanese Garden (one of our first "ambitious" plans) seemed doomed to failure, he guaranteed to "secure" the necessary money, deposited the amount in a nearby bank subject to the check of the director, and authorized the work to proceed. The result was one of the finest examples of Japanese gardening in America, and one of the very few in a public park.*

When the City enlarged the area of the Botanic Garden by transferring to it the tract known as the "south addition," but made no provision for rendering it available for use by fencing it in, it was Mr. White who provided the fence. This area is now one of the most beautiful and useful parts of the Garden.

When the construction of our laboratory and administration building came to a standstill while only about one fourth completed, it was Mr. White who secured, and in part contributed, private funds to the amount of $100,000—one half the cost of

* So far as is known to the writer there is no other Japanese garden in a public park east of the Rocky Mountains.

completion—and thereby secured the appropriation of a like amount by the City. This was on the eve of the Great War, and it is reasonably certain that, but for this gift, the building would have been delayed for a possible ten years. The construction of the greatly needed Children's Building was also made possible by this gift and the resultant appropriation.

In 1919 the City appropriation for per diem labor was only sufficient to meet the payrolls for about two weeks. Except for the private funds secured and, in part, contributed by Mr. White, our lawns would have turned to meadows, and the work of the preceding years would have had to be largely done over again.

When municipal appropriations could not be secured for the enlargement of our educational and administrative force, made urgently necessary by the rapidly increasing demands of the public for the services of the Botanic Garden, it was Mr. White who authorized the necessary additional appointments, and guaranteed to secure the necessary private funds.

After the completion of our Laboratory Building and conservatories, two years passed by without funds becoming available for the proper treatment of the approaches. One of Mr. White's last gifts to the Garden was the conservatory plaza, with its beautiful water lily pools and gardens. This work was not wholly completed at the time of his death.

For the past five years the prizes which have rewarded meritorious accomplishment in our children's work have been provided from the same generous source and sympathetic interest. The boys and girls responded by making Mr. White "one of them," as their president expressed it, electing him to membership in their club. This was an honor which he greatly appreciated.

Alexander Smith, in his essay (in *Dreamthorp*) "On the writing of essays," says, speaking of Montaigne: "On his daily life his Essays grew like lichens upon rocks." So of this man we may say: On his daily life good deeds for the public welfare grew like lichens upon rocks. And a veritable rock he was to many a man and to many an institution or organization

formed for the purpose of making the world better, or wiser, or happier.

Although he had lived well beyond the traditional three score years and ten,* his passing was premature. Barring accident, he apparently had years still to his credit. Only a short time before his death he stated to one of his friends that he had five years of work mapped out for himself and then, five years more. But,

> "That low man seeks a little thing to do,
> Sees it and does it:
> This high man, with a great thing to pursue,
> Dies ere he knows it."

He was a man who instinctively associated with himself that which is choicest—whether in nature, in art, or in character. On this basis he chose alike his books, his pictures, his friends. For a business man he had an unusual knowledge of flowers, but the flowers that gave him most pleasure were the earliest bloomers of spring, and those that are rarest and less commonly known. The pleasure of climbing alpine summits—which he continued into his seventy-fifth year—was never quite complete unless he could find a specimen of the rare *Diapensia.* Frequently, after a wild flower hunt, friends would be asked, "Did you find *Atragene?*" This species of Virgin's Bower (*A. americana*) is described in some of the manuals as "one of our rarest wild flowers."

In a recent beautiful tribute to Mr. White, Dr. Francis G. Peabody drew the following striking contrast: "The bad citizen uses the city for himself; the good citizen uses himself for the city." The entire life of the great citizen we mourn was composed chiefly of deeds which were only details in a plan, definitely conceived and consistently and persistently followed, of using himself for his city and, in a broader sense, for the good of his fellow men. It is only since his death that those who knew of some of his good deeds in Brooklyn have learned of his good deeds in other cities and states; that those who knew of his

* He once, with pleasantry, expressed his contempt for Psalm XC: x.

benefactions in Serbia, Belgium, France, and elsewhere in Europe, have learned of his benefactions at home.

"And how little he thought of reputation," wrote Florence Nightingale to Julia Ward Howe, in congratulating her on the publication of Mrs. Howe's Memoir of her husband. So it was of Alfred T. White. But the benefactions of a true philanthropist are made because of his love of his fellow men, not for the encomiums which they may pour out upon him, and Mr. White found his reward and his satisfaction, not by public recognition of his deeds, most of which were never known to the public, but in the consciousness that those deeds were worth doing, brought pleasure to others, and were done efficiently and well.

All that we have done at the Brooklyn Botanic Garden either could not have been done at all, or could not have been done so promptly and efficiently save, not only for the material contributions, but for the time and thought and sympathy which Mr. White put into it.

An engineer by education, he managed the affair with engineering skill; a man of business by occupation, he managed it with business-like efficiency; a philanthropist instinctively and at heart, he contributed (and secured contributions from others) with a sustained and increasing generosity that is rarely equalled.

What a priceless asset is such a man to an institution, what a rich possession is such a character to any city, what a wonderful stimulus and influence is such a life to his own generation and to those that follow! We gloried in him while he was here, we mourn his loss, we thank God that we had him.

C. Stuart Gager.

ALFRED T. WHITE* (1846–1921)

It is very difficult for me to comply with the request of the *Survey* and hastily write any memorial of Alfred T. White

* Reprinted, with permission of author and publisher, from the *Survey* for Feb. 5, 1921.

without losing my composure. Of all the friends I have made in later life he was the closest. While my first association with him, some thirty years ago, related to philanthropic effort (and that association has been continuous ever since), my real relation to him has long been within the inner circle of congenial and intimate friendship.

While I know of him as a protagonist in the cause of housing reform and as one of the earliest leaders in the charity organization movement, I think of him more as the keen lover of Nature who treasured all that is beautiful. In the wild forests of the Adirondacks, in the wintry solitude of the Highland Lakes, on one of which he lost his life while skating on January 29, he always showed a quick response to the "call of the wild." An early morning ascent of Mt. Marcy, an all day tramp over the Gothics, or an excursion to a remote lake where he had found the most northerly home of our native rhododendron, always attracted him. I am not sure but that he found more companionship on such trips in the solitude of the woods than even in the congenial company of friends. My last conversation with him on the day before he died related. quite as much to the more recent acquisitions of our art museum and the famous Book of Hours of Queen Johanna, which he had had reprinted, as to the projects of the Sage Foundation.

Some thirty years ago I found myself appointed to a national committee of which he was a member. I then knew nothing of him except that his home was in Brooklyn. It was of interest to me to know the character of men with whom I was to be associated. I asked one of the best known business men of Brooklyn who Alfred T. White was. He looked at me with great surprise. Said he—"Is it possible, de Forest, that you don't know? He is the best and most useful citizen of Brooklyn." I shrink from superlatives in characterizing men. There are so many different angles from which attainment can be estimated. I can truthfully say, however, of my own knowledge that there was no more useful and public spirited citizen in Greater New York than Alfred T. White.

He talked and wrote modestly and forcibly. But he did not stop with talking and writing, as so many do. He acted. He accomplished. He arrived.

He was a pioneer in several important fields of constructive philanthropy. He aided helpfully in all. He inaugurated, in 1876, the now national movement for tenement and housing reform. He also joined in starting, in 1878, the national movement for the proper organizing of charity. But no one will ever know what were his greatest contributions to the welfare of his fellow men. For many things that he did were done so quietly and impersonally that his name was never connected with them. His right hand certainly knew what his left hand did, for he was too wise and far-seeing not to weigh consequences and act deliberately; but no one else's "right hand" knew what he was doing, unless it were the right hand of his own wife, from whom he was inseparable until they were parted by her death less than a year ago.

The pressing need for tenement reform in New York was known before he entered this field, but he was the first one to effectively grapple with the problem. Characteristically, before he did so he went abroad and studied housing conditions in London. Then he came home and instead of starting any propagandist movement or appealing for legislation, he built the Riverside model tenements in Brooklyn. They were completed in 1878 and an addition was made to them in 1890. The group of buildings, consisting of 527 apartments and some thirty small buildings, was fully described in the report of the State Tenement House Commission of 1894. These tenements were rented on a strictly business basis, intended to produce a fair return on the investment. They have been fully occupied ever since they were built. No tenant was permitted to stay on who had not paid his rent, but I am quite sure that when unavoidable misfortune prevented a tenant from paying his rent it was made up from some source of which the tenant knew nothing. Thus Mr. White, by his example, launched the now national movement for

housing reform, which in New York took the form of the state commissions of 1884, 1894 and 1900, of which last named commission he was a leading member.

It was in association with Seth Low, Darwin R. James, Sr., Charles Pratt, and other public-spirited young men of Brooklyn that Mr. White founded the Brooklyn Bureau of Charities in 1878, one of the best known and most influential charity organization societies of the country. He was president of it for over thirty years. He resigned the office of president last spring but could not escape many of its responsibilities. I asked him whether his retirement from office meant a withdrawal from active work. "No," said he, "I have plenty of work laid out for the next five years, and after those five years are over I have a program for five more years which will fully occupy me." Would that he had lived to fully carry out this philosophy of life!

Alfred White's official relations to charity included almost every important institution of Brooklyn and very many outside. I will only attempt to enumerate a few of them.

The Brooklyn Children's Aid Society was a lifelong interest. So was the Brooklyn Society for the Prevention of Cruelty to Children and the State Charities Aid. The After-care of Infant Paralysis and the systematic instruction of the blind were more recent interests. He was a leader in the establishment of the Brooklyn Botanic Garden, and when the City of New York declined to appropriate sufficient money to install* it, and was only willing to provide one-half the necessary amount if the other half could be provided elsewhere, Mr. White arranged to provide it elsewhere.

He was one of the original trustees of the Sage Foundation, selected by Mrs. Russell Sage. He was one of the leaders of the National Red Cross, active not only in his own city but at one time a member of its national executive committee. He was a charter member of the Survey Associates.

* This refers to the completion of the buildings and certain other permanent improvements. *Ed.*

He was one of those decorated by the King of the Belgians as a member of the Belgian Relief Committee of 1914, which antedated Mr. Hoover's later and larger measures.

He held public office but once, when he served as commissioner of works for Brooklyn from 1894 to 1896, and made a notable contribution to the solution of Brooklyn's water supply.

He gave buildings to his own college, the Rensselær Polytechnic. It has only recently become known that he endowed the chair of Social Ethics at Harvard.

When Mr. White resigned as president of the Brooklyn Bureau of Charities he made an address which seemed to me so singularly appropriate that I have kept a copy of it. He began by saying—"This is not a farewell address. I am not proposing to retire from this board so long as you wish me to remain a member of it, or to lessen my interest in the helpful work of this society." And he closed it by saying—"For myself, I have the rare felicity described by Wordsworth in his 'Happy Warrior,' of the man 'who hath wrought upon the plan that pleased his youthful thought and seen what he foresaw.' Few live to enjoy the privilege of seeing early dreams and visions grow in some measure into helpful realities." And with characteristic modesty he added, "That I have that privilege I owe to your cordial cooperation, the self-denying efforts of a wonderful staff of workers and volunteers, and the confidence and support of this great community."

The Happy Warrior has now gone to his rest honored and beloved by all who have come to know him, and they are many.

ROBERT W. DE FOREST.

RESOLUTION

ADOPTED BY THE BOARD OF TRUSTEES

(From the minutes of the regular monthly meeting of the Board of Trustees of the Brooklyn Institute of Arts and Sciences, February 10, 1921)

Mr. A. Augustus Healy, Chairman of the Committee of Three, appointed by President Babbott to draft appropriate resolutions

in memory of Alfred T. White, a Member of the Board of Trustees, a Benefactor of the Institute, and Chairman of the Botanic Garden Governing Committee, who met his death suddenly on January 29, submitted the following resolution which was adopted by a rising vote:

To this City, to the State and to numberless personal friends a great sorrow has come in the sudden and untimely death of Alfred T. White. Practically the whole of Mr. White's mature life was given to benevolences to which he brought not only large means but a devoted personal attention which greatly augmented the value and significance of his gifts.

Few are the charities in which he was not concerned and many are the people, especially those of the Borough of Brooklyn, who have experienced his considerate kindness and generosity, more highly valued because accompanied with a sympathy remarkable for its depth and genuineness. The memory of Alfred T. White's great mind and heart is a priceless possession of the City.

The Trustees of the Brooklyn Institute of Arts and Sciences, mindful of the many services and benefactions of Mr. White to this Institution and conscious of a loss almost overwhelming, desire to record their gratitude and admiration for the life of Mr. White and their sorrow at his death in the following resolution:

Resolved, That in the death of Alfred T. White the Brooklyn Institute of Arts and Sciences, and especially the Department of the Botanic Garden, has lost one of its most highly valued, beloved and useful members, one whose shining personal qualities endeared him to each of his associates and whose wisdom and judgment carried weight in all of the affairs of the Institute.

ALFRED TREDWAY WHITE

Resolutions Adopted by the Staff of the Brooklyn Botanic Garden, January 31, 1921

The members of staff of the Brooklyn Botanic Garden have learned, with profound sorrow, of the death of Mr. Alfred T.

White. To him, more than to any other individual, was due the establishment of the Garden ten years ago, and he has given so largely of his time, his thought, his wise counsel, and his substance, that it is difficult to foresee how the institution can continue without him.

A lover of plant life and of beauty in every form and especially a lover of his fellow man, his name was synonymous, not only with the Brooklyn Botanic Garden, but with every good work for the public welfare, both in his native city and in the State and Nation.

By the sweetness of his nature, and the beauty of his character he had endeared himself to each one of us, and we wish to record our deep sense of personal loss in his passing, and to extend to his daughter, to his sisters and brothers, and to all others who are close to him by family ties, our heartfelt sympathy in their sorrow and loss.

A LETTER
From the Boys and Girls of the Brooklyn Botanic Garden

In place of more formal resolutions, the committee of the Boys and Girls Club drafted and forwarded the following letter:

To the family of Mr. Alfred T. White: We are writing as representatives of the Boys and Girls Club of the Brooklyn Botanic Garden.

The boys and girls of the Botanic Garden loved Mr. Alfred T. White dearly. We had good times together, and he was the first Honorary Member of the Boys and Girls Club. He did so many good things for us that we gave him a gold medal like our own medals which he gave to us.

We shall miss him very much as he always came at least once a year to a meeting of the Boys and Girls Club and spoke to us. He also came to us to present us with prizes which he gave to us. We do not love him because he gave us many nice things but because he enjoyed things we did.

We are very glad that there is an Alfred T. White Scholarship because publicly there will be one boy or girl a year to represent Mr. Alfred T. White, but really there will be hundreds of boys and girls at the Garden who represent him.

We are writing you this letter to tell you that we are glad Mr. Alfred T. White lived in Brooklyn and that he loved us.

(*Signed*)

Gordon Hart, *President*
John Schmacke, *First V. P.*
Thekla Jung, *Second V. P.*
Mary F. Asch, *Third V. P.*
Gustav Magnusson, *Treasurer*
Everett Steeves, *Representative of all the boys and girls classes.*

February 19, 1921.

SPECIAL MONTHLY REPORT OF THE DIRECTOR, FEBRUARY 10, 1921

To the Board of Trustees:

Gentlemen: For purpose of record I file with the Secretary the customary report of figures and items for the preceding month. The irreparable loss which the Brooklyn Botanic Garden has suffered in the death, on January 29, of Alfred T. White, the first and only chairman of its Governing Committee, makes all other events of the past four weeks seem wholly insignificant. The man who, more than any other person, made possible the establishment of this Garden, and whatever of service it has rendered to education, to science, to the city during the past ten years, is no longer with us, forever. How can we go on without him? How can *I* go on without him?

No administrative officer ever had more intelligent, more sympathetic, more enthusiastic, more sustained, or more generous and helpful support than the director of the Brooklyn Botanic Garden has had from this wonderful man. However high our ideals, their approach would have been impossible without him; however discouraging the outlook, as it has been at times, it was he who made discouragement impossible.

No detail of development and administration was too small to receive his attention when asked; no ambitious dream of a director was too ambitious to receive his approval, if only a way could be found to bring it to realization. Almost without exception the way was found through the seemingly unlimited generosity of himself and the two, dear to him, who shared his enthusiasms, his pleasure, and his benefactions.

On one occasion I presented to him a plan for the organization of our scientific and educational work on a scale that meant the development of the Garden, not merely as a local institution, but with reference to the broad needs and opportunities of botanical science throughout the world. I remember the trepidation with which I mailed the letter, fearing lest the plan might impress him chiefly as an expression of unrestrained enthusiasm. I recall also the satisfaction and sense of secureness with which I read his prompt reply: "I rejoice in your high ideals."

The Botanic Garden is one of his many monuments, but he was the last man to wish or to take pleasure in a monument. His satisfaction would have been in the fact as it is, that the Botanic Garden is one of his many good works, which, long after he has passed from earth, will continue as a blessing to his city and to mankind.

To have known him was a rare pleasure; to have been associated with him in work for the public welfare was a great privilege; to be able to claim him as a personal friend was an honor of which one may be justly proud. His life was a benediction, his memory is a precious heritage for all time to come.

C. STUART GAGER,
Director.

PUBLIC MEETING IN MEMORY OF MR. WHITE

A public meeting in memory of Mr. Alfred T. White was held in the Academy of Music, Brooklyn, on Sunday, April 3, 1921, at four o'clock, under the auspices of the Alfred T. White Memorial Meeting Committee of 122 citizens of Brooklyn and other cities. President Frank L. Babbott represented the Brook-

lyn Institute of Arts and Sciences on the Executive Committee, and Mr. Edwin P. Maynard, member of the Botanic Garden Governing Committee, and Mr. James H. Post, trustee of the Brooklyn Institute, were also members of the general committee. The program was as follows:

ORGAN PRELUDE

March Solenelle ..... Borowski
Meditation ..... Guilmant

R. Huntington Woodman

INVOCATION

Rev. Richard Roberts
Church of the Pilgrims

QUARTET—In Memoriam ..... Dudley Buck

Corinthian Male Quartet

ADDRESS ..... "The Leader in Housing Reform"

Robert W. de Forest, Presiding
The New York Charity Organization Society

ADDRESS ..... "The Public Servant"

Rt. Rev. Mons. Edward W. McCarty
St. Augustine's Church

ADDRESS ..... "The Neighbor"

Dr. L. Mason Clarke
First Presbyterian Church

ANTHEM ..... Mendelssohn

The righteous living forever shall shine as the firmament. They that serve the Lord with faithful service, they shall be like the stars of heaven. Our God saith I will exalt them.

Corinthian Male Quartet

ADDRESS ..... "The Friend of Education"

Major R. R. Moton
Tuskegee State Normal and Industrial Institute

ADDRESS ..... "The Characteristics of a Good Citizen"

Prof. Francis G. Peabody
Harvard University

HYMN ..... "The City of the Lord"

Sung by the Audience

ORGAN POSTLUDE—Marche Religieuse ..... Guilmant
(On the theme "Lift Up Your Heads" from Handel's Messiah)

R. Huntington Woodman

BIOLOGICAL EXPLORATION OF THE AMAZON BASIN

Dr. O. E. White, curator of plant breeding on the Botanic Garden staff, has been granted leave of absence for the purpose of joining the Mulford Expedition for the biological exploration of the Amazon basin. Prof. H. H. Rusby, dean of the College of Pharmacy, Columbia University, is director of the expedition, and is admirably equipped for such leadership through his previous experience in South American exploration. In 1885–87 he explored the Medeira river valley and Bolivia, and in 1896 the delta of the Orinoco.

The party sailed on June 1, on the steamship Santa Elisa of the Grace line, for Arica, Chili. From La Paz they will proceed westward into the *terra incognita,* crossing the Andes at an elevation of over 19,000 feet. The base for the explorations will be Calomar.

The membership of the party includes Dr. Frederick L. Hoffman, statistician and vice-president of the Prudential Insurance Company, anthropologist, who will study sanitary conditions and public health in the regions visited; Dr. William M. Mann, assistant entomologist, Bureau of Entomology, U. S. Department of Agriculture, entomologist of the party; Dr. Everett Pearson, University of Indiana, representing Dean Eigenmann of that University, as ichthyologist; Mr. George S. McCarty, Woodbury, N. J., stenographer and taxidermist; Mr. Gordon McCreagh and Mr. Owen Cattell, photographers. Dr. White goes as representative of both the Brooklyn Botanic Garden and the Bussey Institution of Harvard University, these two institutions cooperating in the expense of the trip. His collections will include both living and preserved specimens of plants, with special emphasis on orchids, plants and seeds of possible economic use, and plant diseases. It is anticipated that the Botanic Garden collections will be greatly enriched as a result of this work, and that the exploration will yield results of great scientific importance. The party expects to be absent about fifteen months.

SPRING INSPECTION

The seventh annual spring inspection of the Brooklyn Botanic Garden was held on Tuesday, May 10, 1921. Beginning at 3.30 p.m., brief exercises were held in recognition of the tenth anniversary of the Garden, and of the services of Mr. Alfred T. White in its foundation and development.

The weather was all that could be desired, and the grounds never looked better, nor were there ever more plants in bloom on the day of the inspection. During the preceding years the energies and time of the Garden had been largely taken with the preliminary work of grading, soil improvement, lawn making, initial planting, and the construction of walks and buildings. This work is not yet completed, but this year the Garden began to give promise of the beauty toward which we have been aiming during the past ten years.

Owing to the early warm spell in April, many flowers were in bloom that ordinarily do not blossom until after the date of the inspection. The azaleas were nearly all in full bloom, the iris were coming into flower, and the rock garden and Japanese garden never looked more beautiful.

About 350 trustees, Auxiliary and Garden members, and their friends assembled in the auditorium where Mr. Frank Bailey, the newly appointed chairman of the Botanic Garden Governing Committee, presided. Mr. Bailey spoke briefly of the great loss which the Garden had sustained since its last inspection, one year ago, in the sad death of Mr. White, who, as Mr. Bailey fittingly said, was heretofore conspicuously present, but this year conspicuously absent.

A cablegram was read from Mr. A. Augustus Healy, honorary president of the Institute, and now traveling in Italy, expressing his regret at not being able to be present, and also containing a word of tribute to Mr. White. This was the first time Mr. Healy had not been present at the annual spring inspection.

In the absence, also in Europe, of President Babbott, Mr. Walter H. Crittenden, first vice-president of the Institute, was

to have spoken to the subject, "Laying the Foundations." He was, however, not able to be present.

Principal John J. Winter, of Public School No. 98, told in a brief talk just how the Botanic Garden is cooperating with the public schools to enrich their work in nature study and geography, and indirectly in other subjects.

Dr. Gager, the director of the Botanic Garden, paid a brief tribute to the memory of Mr. White, and then showed a series of stereopticon views of photographs taken at intervals from the beginning, ten years ago, until the present year, showing vividly the progress that had been made in developing a hitherto unsightly and largely useless piece of public land into one of the most beautiful and most frequented spots in Brooklyn, and in fact, in the Greater City. The views also showed the extent to which the educational work of the Garden had spread in Brooklyn, until 78% of the grammar schools and 100% of the high schools were now making use of the Garden's facilities in one way or another. Reference was also made to the scientific work of the Garden, and a map of the world was shown with lines radiating from Brooklyn to show the extent of the circulation of the Garden's publications, covering nearly every civilized country and practically every scientific and educational center in the world. These maps were published in the Tenth Annual Report of the Garden.

In showing these slides, Dr. Gager called attention to the fact that every item in the Garden's progress of the past ten years was a tribute to Mr. Alfred T. White, who, more than any other single individual, had made all of this progress possible.

The exercises in the auditorium were followed by an inspection of the new children's room, for the use of the Boys and Girls Club of the Garden. This room was made possible by a gift from Mrs. George D. Pratt.

During the serving of tea by the Woman's Auxiliary in the main rotunda at five o'clock, an opportunity was afforded to inspect an exhibit in the library of the books, articles, and periodicals published by the Garden and its members of staff during the past decade.

Tea was followed by an inspection of the grounds under the guidance of members of staff. Following the Garden flag, the Japanese garden, the iris along the brook, the rock garden, the new children's flower garden, the new bubbler drinking fountain (a recent gift at the children's garden), and the azaleas were visited in turn.

NOTES

We learn from *Science* that the Paris Academy of Sciences has awarded botanical prizes as follows: The Desmazieres prize to Andre Maublanc, for his work in mycology and plant diseases; honorable mention to Pierre See, for his book on the diseases of paper; the De Coincy prize to Lucien Human-Merck, for the whole of his botanical work. The Montagne prize is not awarded.

The death at Florence on October 25, 1920, has been announced of Dr. Odoardo Beccari, Director of the Botanic Garden at Florence. Professor Beccari was a specialist and authority on the classification of palms, and had conducted explorations in New Guinea between 1860 and 1870.

"A Living Outdoor Museum" is the title of an interesting article by Melvin R. Gilmore, Curator, State Historical Society of North Dakota, in Museum Work for February, 1921. The article is illustrated by a copy of the landscape architect's plan for the arrangement of the Capitol Grounds and historical park at Bismarck, N. D. As stated in the Legislative Act which provides for the creation of the park, it is "planted and laid out in such manner as to afford an appropriate outdoor museum and grounds to be planted with trees, shrubs, vines, grasses, flowers, and other plants native to the State," thus, the author states, "forming a living museum of the native flora of North Dakota. Besides making this a living museum of the native flora of the State, we expect also," says the author, "to include plots of

ground bearing growing crops of the products of the aboriginal agriculture of the region. These crops will be grown from seed of the stock obtained directly from the local tribes, and which they have been cultivating continuously in this region for centuries. The crops which they have been cultivating here since pre-Columbian times are corn, beans, squashes and pumpkins, tobacco, and sunflowers." The article contains considerable interesting information about the woody plants of the region, which are also to be included in the planting of the Capitol Grounds, including some of the Indian lore and customs based upon the native flora and aboriginal agricultural products. This would appear to be a unique plan for the development of the grounds of the State Capitol.

The annual report of the director of the Botanic Gardens at Sydney, New South Wales, for the year 1919 contains the following statement:

"Trees that break into growth early in the spring, especially deciduous trees, are usually by the close of the year showing 'the sere and yellow leaf,' not of autumn, but from the effect of the smuts and smoke of the vessels ploughing through Port Jackson, or lying at the wharves. Then we have the noxious effects of the smoke of a large city, the Sydney Botanic Gardens being within the city itself."

Evidently the Brooklyn Botanic Garden is not the only institution of the kind to suffer grievously from the unfavorable atmospheric conditions of a large city due to the great quantities of smoke and fumes pouring into the air from innumerable stacks and chimneys.

Need and Importance of Botanic Research.—In his annual report for 1920 to the President, the Secretary of Agriculture comments as follows on the need and importance of botanical research:

"We are at a stage of our agricultural progress where fundamental research and investigation are more essential than ever before. We are confronted today with serious problems of the

most pressing nature about which we know relatively little. No one acquainted with the situation will deny that it would be the part of wisdom to concentrate the best of the brains of the country on these problems and to provide adequate facilities for carrying on the work in the most comprehensive manner."

"The toll exacted by plant disease is appalling," says the report. "It is estimated by the department that in 1919 field diseases were responsible for the loss of approximately 190,000,000 bushels of wheat, of 78,000,000 bushels of oats, 200,000,000 bushels of corn, of 86,000,000 bushels of potatoes, of 58,000,000 bushels of sweet potatoes, of 18,000,000 bushels of apples, and of 1,742,000 bales of cotton. The cost of producing diseased and healthy crops up to the time of harvest is practically the same, so it is clear that plant diseases are a grievous and dangerous overload on our agriculture."

Visitors to the Garden since January 1 include Prof. J. R. Schramm, Cornell University (Feb. 11), Dr. Edward B. Chamberlain, Secretary-treasurer, Sullivant Moss Society (Feb. 19), Mr. O. M. Eastman, Supervisor of Gardens, Cleveland, Ohio, Mr. A. C. Gorham, Director of Rural Work, Sussex, N. B., Miss Mabel Turner, formerly Supervisor of Gardens, Malden, Mass. (Mch. 5), Prof. F. E. Melchers, State Agricultural College, Manhattan, Kan. (Mch. 8), Prof. K. S. Ryu, Professor, College of Agriculture, Morioka, Japan (April 8), Dr. M. A. Raines, University of West Virginia, Prof. H. H. Whetzel, Cornell University (May 17), and Mr. H. P. Agee, Director of the Experiment Station of the Hawaiian Sugar Planters Association, Honolulu.

On Wednesday, May 18, a class of 50 children from one of the public schools of Bayonne, New Jersey, visited the Garden. This shows a commendably broad policy on the part of the school authorities of Bayonne and also bravery as well as enthusiasm on the part of the teachers in charge.

On Tuesday evening, May 24, the Winter's Night Club held its regular meeting for that date at the Botanic Garden. The daylight saving time, combined with a moon just past the full, made an inspection of the plantations especially delightful between eight and nine o'clock.

Among plants in bloom as early as March 11, 1921, were the spring Adonis (*Adonis vernalis*), *Bulbocodium vernum,* the cornelian cherry (*Cornus Mas*), and the hazel (*Corylus americana*). This was one of the earliest springs since the establishment of the Garden, ten years ago.

At the unveiling of the bronze tablet, on June 18, at the State College for Teachers, Albany, N. Y., to the memory of the students who gave their lives in the World War, the memorial address was delivered by Dr. C. Stuart Gager, an alumnus of the college and for eight years professor there of biological sciences and physiography. At the commencement exercises of the College, on June 20, the honorary degree of Doctor of Pedagogy was conferred on Dr. Gager.

On Wednesday afternoon, May 25, Miss Ellen Eddy Shaw, Curator of elementary instruction, presented a paper on "Educational Work at the Brooklyn Botanic Garden" before the American Association of Museums at Cleveland, Ohio. The Association was in session from May 23 to 26.

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PUBLICATIONS
OF THE
BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the *Annual Report* of the directors and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others one dollar a year; 25 cents a copy.

MEMOIRS. Established, July, 1918. Published irregularly. Volume I, *Dedication Papers:* comprising scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. Price $3.50, plus postage.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

12. *Endemism in the flora of the vicinity of New York.* 10 pages. 1916.

13. *The origin of new varieties of Nephrolepis by orthogenetic saltation. I. Progressive variations.* 28 pages, 6 plates. 1916.

14. *A white-cedar swamp at Merrick, Long Island, and its significance.* 10 pages, 5 plates. 1916.

15. *Present status of the problem of the effect of radium rays on plant life.* 8 pages. 1916.

16. *Flora of the vicinity of New York.* 6 pages, fig. 1. 1917.

17. *Endophyllum-like rusts of Porto Rico.* 9 pages, 3 plates. 1917.

18. *Inheritance of endosperm color in maize.* 11 pages. 1917.

19. *Studies of inheritance in Pisum. II. The present state of knowledge of heredity and variation in peas.* 102 pages. 1917.

20. *Inheritance studies in Pisum. III. The inheritance of height in peas.* 7 pages. fig. 1. 1918.

21. *A sketch of plant classification from Theophrastus to the present.* 16 pages. 1918.

22. *A basis for reconstructing botanical education.* 6 pages. 1919.

23. *Plant families: a plea for an international sequence.* 9 pages. 1920.

24. *Plants and animals of Mount Marcy, New York.* 69 pages, 1 plate, 22 figs. 1920.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

SEED LIST. Issued in December of each year.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in cooperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $6.00 a year.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $3.00 a year.

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EDITED BY

C. STUART GAGER

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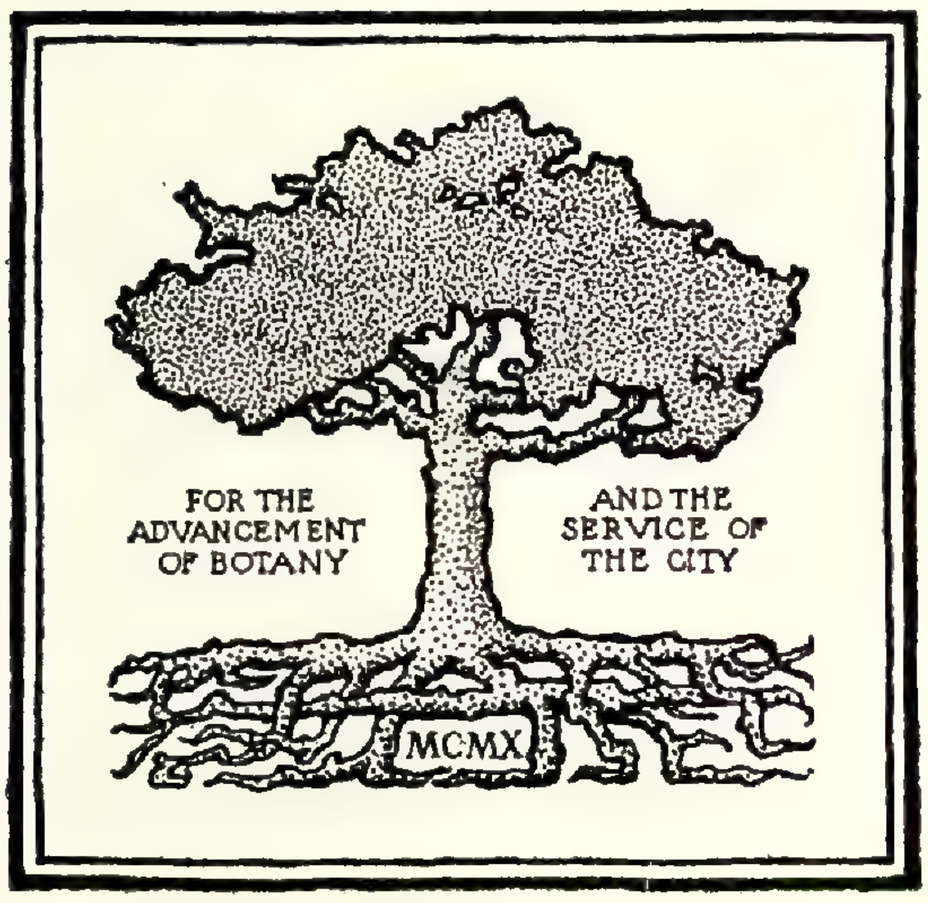

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BROOKLYN BOTANIC GARDEN

RECORD

VOL. X October, 1921 No. 4

A. AUGUSTUS HEALY

"I am to see to it that the world is the better for me, and to find my reward in the act."—*Emerson in Man the Reformer.*

For the second time during the present year the Brooklyn Botanic Garden has suffered the loss of one of the small group of men who were instrumental in its establishment. Next to Mr. Alfred T. White, the "father" of the Garden, whose passing was recorded in the preceding number of the RECORD, no man has taken a more sustained or more intimate part in laying the foundations of this institution than has Mr. A. Augustus Healy. From the first meeting of the Botanic Garden Governing Committee over ten years ago, when the Garden existed only in men's minds, until the present year, Mr. Healy was one of the most regular attendants at the meetings of the Committee; his enthusiasm was marked, his interest was intelligent, his counsel was wise and helpful, his financial contributions were substantial.

It was characteristic of the man that, while his interests were primarily in the fine arts, he was active and influential in every movement whose object was to make his city and the world at large a better place to live in. His name was recognized everywhere as synonymous with integrity in business, cleanness in politics, intelligent generosity in philanthropy, the promotion of the arts and sciences, and unostentatious public service.

Mr. Healy was born in Brooklyn June 26, 1850, and in 1895 became President of the Brooklyn Institute of Arts and Sciences,

an office which he held for twenty-five years. He declined to have his name considered for reelection in 1920, and was then

FIG. 8. Mr. A. Augustus Healy speaking at the laying of the corner stone of the laboratory building, October 20, 1916. The central figure in the group is Mr. Alfred T. White, who had laid the corner stone just previous to Mr. Healy's address.

made honorary president, an office which was created as a means of official recognition of his long and invaluable services. By his sudden death in the early morning of September 28, 1921,

the Brooklyn Institute of Arts and Sciences loses another of the pioneers who made possible the development of the Institute, the Brooklyn Botanic Garden loses one of its most generous supporters, and the Borough of Brooklyn loses one of its most valued citizens.

C. STUART GAGER

THE GARDEN'S FERN EXHIBIT IN BOSTON

From September 22–25, 1921, the Massachusetts Horticultural Society held a "Grand Exhibition of Tropical Ferns and Orchids" in Horticultural Hall, the home building of the society in Boston. This was probably the first fern exhibition ever held in this country. In July the Botanic Garden accepted an invitation to make an educational exhibit, not in competition for any of the prizes.

The ferns sent were selected mainly with two aims in view. First, it was desired to present as extensive a collection as possible of the named varieties of the Boston fern (*Nephrolepis exaltata*). Of these the Garden has what is probably the most nearly complete collection in existence gathered together in connection with the investigations of variation and heredity in this group by Dr. R. C. Benedict, resident investigator at the Garden. Since the Boston fern and its varieties constitute one of the most important house plants today, it was felt that an extensive collection of present known forms would be of special interest to the general public, and even more so to the many florists and growers who would attend the show. Sixty-six different varieties of Boston fern and other forms of *Nephrolepis* were sent, including several new forms which have originated at the Brooklyn Botanic Garden.

Secondly, there was sent a collection of forty-two different kinds of ferns not in *Nephrolepis*. These were selected to represent as many different and distinct types as possible, to give an idea of the diversity of the fern families. Twenty-five genera, comprising nine families, were included, from the tiny floating mosquito fern, *Azolla,* to a large *Polypodium aureum,* with a

veritable waterfall of leaves. The total of one hundred and eight different forms gave the Garden third place in the number of kinds shown. Of this total fifty-eight were not shown by any other exhibitor.

With the plants there was exhibited a specially prepared chart, five by seven feet, showing the genealogy of the American varieties of the Boston fern. The plants occupied a section of wall a little over fifty feet long, and were displayed in two arcs about six feet in depth at the middle. "The management of the Botanic Garden," says the *Florists' Exchange* (Oct. 1, 1921), "did some real service, to the commercial grower especially, in placing before his eyes a collection of over sixty sports of *Nephrolepis exaltata,* all correctly labeled and giving, on a large chart on the wall, a genealogy of the present-day forms of the Boston fern."

Dr. Benedict, who served as one of the judges of the competing exhibits, gave a public lecture, before a large audience in the lecture hall, on tropical ferns, illustrated by lantern slides from the Botanic Garden files, showing single typical plants from the Garden collection, and views in our conservatories. A pamphlet of eight pages entitled *Tropical Ferns* was also prepared by Dr. Benedict and was specially printed by the Horticultural Society for free distribution to its members and to visitors at the exhibition.

Sixty-five classes of ferns and other plants had to be considered by the judges. The authorities of the Society, of which Mr. Albert C. Burrage is president, expressed their appreciation of the broad-minded policy of the Brooklyn Botanic Garden in sending a non-competing exhibit to another city and another state, and awarded to the Garden a special gold medal.

NEW MEMBERS OF STAFF

Curator of Public Instruction.—Dr. Arthur H. Graves entered upon his appointment as curator of public instruction on September 1, 1921. Dr. Graves received the degree of doctor of philos-

ophy at Yale in 1907. From 1902 to 1914 Dr. Graves was successively assistant in botany in Sheffield Scientific School and the School of Forestry, and in Yale College, resigning the assistant professorship of botany at Yale in 1914 to do advanced work in the University of London (1914–15). From 1916 to 1917 he was professor of biology in the Connecticut College for Women, and since 1918 he has been pathologist and collaborator, Office of Investigations in Forest Pathology, U. S. Department of Agriculture. Dr. Graves is a member of the American Association for the Advancement of Science, Botanical Society of America, American Phytopathological Society, and the New England and the Connecticut Botanical Societies. He is at present engaged in a study of disease resistance in the American chestnut, with special reference to the chestnut bark canker which, starting near New York City about 1893, has nearly exterminated the chestnut tree in the eastern United States.

Assistant Curator of Elementary Instruction.—Miss Elsie Hammond became assistant curator of elementary instruction on September 1, 1921, in place of Miss Elizabeth Elmer, acting assistant curator, resigned. Miss Hammond graduated from Vassar in 1902, with the degree of A.B., and received the degree of M.A. from Columbia University in 1905. She has taught in the following schools: Detroit Seminary (1906–08); Stuart Hall, Staunton, Va. (1910–11); Ossining School for Girls, Ossining, N. Y. (1911–16); Kemper Hall, Kenosha, Wis. (1916–17); Brooklyn Heights Seminary, Brooklyn, N. Y. (1917–19). In 1920 Miss Hammond completed the course for teachers of children's gardening at the Brooklyn Botanic Garden.

NATURE STUDY OF TODAY*

The two important questions we teachers of nature study should ask ourselves are: (1) Why nature study does not hold the important place in education we feel it should occupy; and (2) What we must do to place it where it belongs.

* Address delivered on November 20, 1920, at the Exercises in connection with the awarding of Certificates in Children's Gardening, at the Brooklyn Botanic Garden.

Among the several reasons why nature study does not hold the place it should, there are two with regard to which beginning teachers should be warned, for, strange as it may seem, nature study has suffered greatly from its ardent advocates.

"Assume a virtue if you have it not," has often been considered good advice, but it does not work in this field. A young lady, acting on this principle, once said gushingly to a gruff college professor of botany, "What would this old oak say, if it could speak?" He, being more honest than polite, said, "Madam, it would say, 'I am an Elm.'"

Less amusing have been the attempts of many actually engaged in the teaching of nature study. Nature study came in with a rush some years ago, and every school had to include it in the course of study, or appear hopelessly behind the times. Teachers, wholly unprepared for the work, were forced into it. Many others, misled by the attractive materials it involves, rushed into it, in spite of their complete ignorance of all foundation material. For, while nature study—both from the point of view of the child and method—is a very different thing from botany, zoology, chemistry, or physics, no teacher of nature study can escape shipwreck—many a time and oft—if she lacks command of the basic principles of these four sciences at least.

Undreamed of dangers lurk in the harmless little gold fish in the school room aquarium, for any minute a child may ask, "How does a fish rise and sink in the water?" It is so easy to give mistaken deductions from what seems to be the most evident relationship or striking analogy. For example, teachers often say, "The sycamore leaf-stalk covers the little bud to keep it warm." A little investigation would bring out two objections to this conclusion: (1) the leaf-stalk drops off before the cold weather comes, and therefore does not function in the way described; and (2) sycamores are warm-latitude, not cold-latitude plants. More common still are faulty generalizations about coloring (attractive coloring, protective coloring, etc.) although many of the errors are obvious even to a child. Very commonly heard is the statement that animals are dark-colored above and lighter below to aid them in escaping from their enemies; whether

living in the water or in the air, they are less easily distinguished from their surroundings when seen against the sky by their enemies from below, or when seen against the earth background by enemies from above. All our lives we have associated the stimulating effects of light and the production of pigment, as in tan and freckles; but most teachers fail to apply this to the pigmentation of animals other than man, and avoid any reference to such animals as blackbirds and cardinals which do not fit their generalization.

Two boats once met off our New England coast, and, as the story goes, the smaller hailed the larger with a piping "Ship Ahoy!" To this came a booming "Ship Ahoy!" from the larger boat. Then the little boat called in its little voice, "What's your name?", receiving in deep-sounding tones the answer "Mandalay." The dialogue continued, "Where from?" "Bombay." "How long have you been out?" brought the rolling answer "Two hundred and forty days." Then the big ship assumed the initiative, with "What's your name?", receiving a thin "Mary Ann." "Where are you from?" "Gloucester." And to "How long have you been out?" came a high-pitched "Been out all night." The application is plain. Too many little Mary Anns attempted work they could not do—either because they were pushed into it or because they were Mary Anns and couldn't appreciate how big a task they had tackled. And the voice of the herald crying the coming of a new educational era has waned to a pathetic Mary Ann squeak.

Even gardening, supported by its immediate practical results, has not been wholly successful. There was an encouraging revival throughout our country during the war, but it was not permanent, as shown by the decrease in the demands we receive for garden and nature study instructors, and by the smaller graduating class in your own institution this year.

Are we right in continuing to combine school garden work with the present type of school year? Can we really do this work successfully unless we have a twelve-month school year of four three-month terms, giving the garden work in the summer fourth. Certain it is, we go contrary to accepted pedagogical

principles now, whether we allow the gardens to perish for lack of care during the summer, or whether we hire others to care for the gardens the two or three months the children are away. In the first alternative, the children sow without reaping; in the second, they practically reap without sowing.

No one has come nearer to a real solution of the problem than the Brooklyn Botanic Garden—and gardens of this kind would be a God-send to any community. We have had so many poor school gardens in connection with good school systems, and so many poor school gardens conducted by private, city or other lay organizations, that it is difficult to understand why boards of education still fail to see two very obvious things illustrated in your children's gardens: (1) that school gardens should be conducted by people trained in the subject matter of gardening; and (2) that educational work by educational experts need not be part of the present nine- or ten-month school period. And yet, how many children's gardens like yours exist in the United States today? This lack brings us back to the second part of our question, what must we do to secure for nature study the recognition it deserves in our educational program?

First, we must keep clearly in mind that although nature study is taught mainly to children it is not a little subject. Because of the complex sciences contributing the materials we use, there is an understandable tendency to use courses, even lessons and detailed facts, worked out by others surer of their foundations. This tends to emphasize details or facts rather than principles and relationships. Facts become ends in themselves, not the illuminating path by which we advance.

To prevent this, facts should be seen only in relation to some larger idea or principle. If facts themselves are the important thing, the child who counts rabbit's teeth contributes as much as the child describing their chisel-like, cutting edge. Similarly, the child who notes that the upper lip is pink has given as important a characteristic as the one who discovers that the upper lip is cleft down the middle to allow its complete retraction in gnawing bark. Children can be made to distinguish between the values of such details only by measuring them up against some main

question or problem, such as "Why can a duck live in water when a hen can not?" or "How does a rabbit secure food?" We must drop forever such directions as "What can you tell me about the butterfly?" or "Tell all you can about the fish." The work should be directed by thought-producing questions, and the child's answers must be more than mere observations; they must involve comparison and discrimination, as well as exact expression.

Second, we must adapt our material not only to the age of the child, but to the local conditions. Caring for an ordinary school garden with its mechanical routine of weeding and cultivating may be the very last thing the farmer's child wants to do—and the very last thing we should allow him to do. His home duties give more than he needs of the routine part, and what he wants is something that adds interest to the familiar routine, or develops an inquiring attitude toward the possibilities of what is apparently a monotonous life. For example, laboratory work, explaining why things are as they are, would be much more interesting to him—at the time and ever afterward—if it included experiments demonstrating air in soils, the presence of moisture in even the driest of soils, the effect of lime on texture and acidity, or "dry farming" principles, showing why we "cultivate" crops even in dry weather. Such things give a different and a richer viewpoint; to a farmer's boy so taught, hoeing beans or cultivating corn can never be so boring again.

This second point merges into my third—we must emphasize the enriching values of nature study—its peculiar contributions to life's background. It is quite possible to avoid sentimentality and yet color more richly one's whole life.

One farmer's wife—or one city shop girl—catches a red flush in the sky and thinks vaguely, "a pretty sunset" or "That's the reddest sunset I ever saw," and that is all it means to her. Another woman, on the adjoining farm—or on the next telephone stool—has read that dust particles interfere with the passage of light rays, and realizes that the great amount of dust in suspension this hot summer day has interfered unequally with the light rays that make up our ordinary daylight—holding back the

weaker blue rays while the stronger red rays have made their way through. Even a cloudless or "plain blue" sky is interesting to such a person. The weaker blue rays always find difficulty in getting through our atmosphere, and when we look up into the sky we look up into these held-back rays and say "The sky is blue." Both types of people enjoy the red sunset, both see the blue sky, but which gets most out of the experience? Which type would be least bored waiting at a trolley transfer station or least lonesome when alone? Both types might enthuse about such situations—even write a poem about it—but which poem would be more worth reading? It takes more than facts and feelings—more than observations and emotions—it takes thoughts or intellectual associations to make life all it should be.

Dickens, in *Our Mutual Friend,* says that no person who can read ever looks at even the outside of a book in the same way as a person who can not read. It is just as true of the book of nature.

Burroughs, in discussing color in birds (reds, yellows and greens as due to pigments, and blues and whites as due to air spaces in the feathers) says that a person who admires color without some of the intellectual background gets little more enjoyment out of such things than an idiot playing with his jangling bits of glass. That is a little severe, but we must agree that both are limited to emotional enjoyment only, and that to one whose *mind* is stimulated, such color associations enrich his experiences manyfold.

Fortunately, much of this desirable attitude or background can be gained through reading. I have seen children of the fifth grades interested in coloring as described in Beebe's book, *The Bird,* and in John Van Dyke's *Nature for Nature's Sake.* As an illustration, I selected color as, perhaps, simplest in its appeal, but every homely phase of life has its similar, unsuspected rewards. We have sometimes smiled—somewhat enviously, I imagine—at the extreme versatility of Theodore Roosevelt, who could talk or write on any subject; he was equally at home among the mammals of Africa, amid the unexplored rivers of South America, or hunting birds without a gun in England. But do you think he was ever bored with life?

This may seem a heavy burden to impose upon a teacher—a greater responsibility than you realized when you began your training. It does mean work—hard work. But there is no subject in the curriculum where every minute of the time expended will mean more direct, constant and lasting value to the teacher herself. But we knew it meant work when we began our training, I am sure, for it is called nature *study*; and we must live up to our subject.

JEAN BROADHURST

NOTES

Special Exhibit.—In connection with "America's Making," a festival and exhibit of three centuries of immigrant contributions to our national life, the Brooklyn Botanic Garden placed on exhibit, from October 15 to 30, specimens showing the more familiar plants of the local flora in two groups: (1) Those strictly native to North America; (2) Those introduced from foreign countries—*i.e.*, plant immigrants. The exhibit also included introduced plants of economic importance, with an indication of the country to which we are indebted for their introduction. A special *Leaflet* (Series IX, No. 8) was issued as a guide to the exhibit. America's Making was held under the auspices of the State and City departments of education of New York, and continued for about two weeks. The exhibits and pageants were held in the 71st Regiment Armory, Manhattan, and in various public school buildings throughout Greater New York. The purpose of the festival was to show, in popular form, the most important historical, economic, and cultural contributions that Americans of various lines of racial descent have made to the American nation, including agriculture and industry, arts and crafts, architecture, folk-lore, literature, drama, music, and education during the past three hundred years. The total attendance was over 5600.

During the month May, 1921, the senior and junior classes of the Montessori Training School of the Child Education Founda-

tion, New York City (thirty students), came to the Botanic Garden for their nature study work with plants (five sessions in all) under the instruction of Miss Shaw.

Botanic Garden Visit.—"Splendid weather and a large attendance made a complete success of the visit of the Brooklyn Chamber of Commerce to the Brooklyn Botanic Garden last Tuesday, June 7. The auditorium of the Garden was well filled when the gathering was called to order and much interest was shown in the short talks and in the explanation of the work of the Garden. Frank Bailey welcomed the visitors on behalf of the Botanic Garden Committee of the Brooklyn Institute of Arts and Sciences. Former Borough President Lewis H. Pounds, a member of the Board of Directors of the Chamber, responded on behalf of the Chamber. Dr. C. Stuart Gager, curator of the Garden, then gave a brief account of the history of the institution and of the work it is doing, illustrating his talk with lantern slides.

At the conclusion of the meeting the visitors were escorted to all points of interest in the Garden. They saw the wild flower garden, the rock garden, the Japanese garden and other special features, all of which were fully explained. Great interest was shown in all these features and it was the unanimous opinion of all who participated in the visit of inspection that the Brooklyn Botanic Garden deserved the hearty support of the Brooklyn Chamber of Commerce and of all Brooklyn."—*Brooklyn Chamber of Commerce Bull.*, June 11, 1921.

Mr. John A. Stevenson, chief pathological inspector, Federal Horticultural Board, U. S. Department of Agriculture, accompanied by Mr. Lester C. Griffith, Mr. Joseph Rubinger, and Mr. H. L. Sandford, inspectors, visited the Garden on July 9. Messrs. Griffith and Rubinger spent several days at the Garden inspecting the conservatories and plantations with special reference to newly introduced insect and fungus pests.

Work on the contract for the extension of the underground coal cellar, between the laboratory building and the conserva-

tories, began on August 8, and was completed on October 7. This carries the cellar to the street curb, and increases its capacity from 227 to 334 tons.

Award of Certificates.—On Wednesday afternoon, July 13, certificates in Children's Gardening were conferred on four students who had completed the course, as follows: Miss Daisy D. Colburn, Plainfield, N. J.; Miss Margarethe Potter, Ossining, N. Y.; Miss Etta Simpson, Yonkers, N. Y.; Miss Ethel Woodward, Chester, Pa. On behalf of the class, Miss Colburn presented the Garden with a terra cotta gnome, in color, for the children's room in the laboratory building. A social time followed the formal exercises.

At a meeting of the National Council of Garden Teachers, Feb. 28, 1921, Miss Ellen Eddy Shaw, curator of elementary instruction, was made second vice-president.

Boys and Girls Club.—At the meeting of the Boys and Girls Club, April 30, reports were made on special problems for silver pins. The topics were, seed testing, kinds of seed, cabbage and kohl-rabi, fantastic plants, tea, cocoa, cork, tomato, orange, and lemon. The reports, illustrated by notebooks and specimens prepared by the boys, gave the results of "investigations" made by the boys in the children's greenhouse and the laboratory and library of the botanic garden. This is course **A5** in the *Prospectus*, open to boys over twelve years of age who have had previous courses at the Botanic Garden. The silver pins were presented by Dr. Gager.

The annual ice cream party of the Boys and Girls Club, and the award of certificates and silver pins were held in the Lecture room on September 17, at 10:30 A.M. Certificates for a course in the identification of trees were presented by Mr. Stoll to eleven boys. Douglas Amann, a member of the Club, entertained those present with a very interesting and creditable sleight-of-hand performance, after which silver pins, in recognition of

excellent work in special horticultural problems, were presented to four boys. Pocket lenses were presented by Miss Shaw to five girls and six boys for excellence in notebooks, and to one boy for faithful service in the children's garden and other courses. The money for the purchase of the lenses was donated, unsolicited, by an anonymous friend of the Garden. On behalf of the Boys and Girls Club, Everett Steeves presented to the director a sum of money for the purchase of a new silk flag, and also for the continued maintenance of the French war orphan. The Alfred T. White scholarship, of One Hundred Dollars, was awarded to Miss Lillian Baker, a former president of the Club, who has been in our children's classes for seven years. Miss Baker will enter the New Rochelle College this fall. This scholarship was awarded for the first time last year, the presentation at that time being made by Mr. White in person.

Prof. Arthur de Jaczewski and Prof. N. I. Vavilov, of Petrograd, Russia, visited Brooklyn on August 25. Professor Jaczewski is director of the Institute of Mycology and Phytopathology of Russia, at Petrograd, and President of the Mycological and Phytopathological Society of Russia, and of the Russian Horticultural Society. Professor Vavilov, formerly professor at Moscow, is editor-in-chief of the Russian Phytopathological Society, and has recently been made director of the Bureau of Applied Botany and Plant Breeding at Petrograd. Both men are visiting the various botanical institutions of England, France, Germany, and the United States in order to get in touch with scientific work from which, they state, they have been completely isolated for six years. Professor Vavilov visited the Garden on October 7, and November 10, and Professor Jaczewski on November 7.

On July 23 Professor Broadhurst and a class of fifty students in nature study from Teachers College, Columbia University, visited the Botanic Garden to inspect the children's gardens and other phases of our public instruction. On August 1 the curator of elementary instruction addressed this class at Teachers Col-

lege on the subject, "The basis nature study should provide for high school biology." During July other classes visited the Garden from Columbia University and Hunter College.

The death of the noted naturalist and author, John Burroughs, last March 29, removed for the second time by death an honorary member of the Boys and Girls Club. A handwritten autographed letter by Mr. Burroughs, under date of May 14, 1919, accepting this honorary membership, is one of the treasures of the Club.

Miss Matilda Holmgren, principal of one of the schools in Malmö, Sweden, visited the Garden on August 11 to inspect the work in elementary education. Prof. J. Andrew Drushel, president of the American Nature Study Society, and Mr. B. G. Shackelford, Director of the St. Louis Section of the Society, and principal of one of the St. Louis schools, also visited the Garden on the same day.

Recent visitors to the Garden include Prof. Kingo Miyabe, professor of botany and director of the botanic garden, Tohoku Imperial University, Sapporo, Japan; and Dr. O. E. Jennings, professor of botany, University of Pittsburgh, and curator, Carnegie Museum, Pittsburgh, Pa.

Children's Garden Exhibit.—The Eighth Annual Children's Garden Exhibit was held in the laboratory building on Friday and Saturday, September 23 and 24, 1921. The exhibit shows a noticeable improvement in quality from year to year. This year vegetables preponderated slightly over flowers. The trophy for the best school exhibit was won this year, for the third year in succession, by P. S. 89, which, therefore, becomes the permanent possessor of the trophy, a bronze tablet, an illustration of which appeared in the RECORD for April, 1919. The attendance was 1,379.

At the "Flower Show," held by the New York Association of Biology Teachers at the American Museum of Natural History

September 30 and October 1 and 2, the Brooklyn Botanic Garden exhibited its installation of living plants arranged to illustrate the evolutionary development of the plant kingdom. Of the Garden staff, Dr. Gundersen served as committee on names, and Miss Shaw and Mr. Free acted as judges.

The Froebel Society, of Brooklyn, held its October meeting at the Botanic Garden on the afternoon of the third. The program included an address by Dr. Gager on "The civic value of a botanic garden." At the close of the address Dr. Graves conducted the members through the conservatories, a severe rain making the intended inspection of the grounds impracticable.

The Alleged Germination of Seeds from Mummy Cases.—The persistence of error is, perhaps, nowhere better illustrated than in the oft-repeated story of the germination of seeds taken from the cases of Egyptian mummies, and therefore two or three thousand years old. Notwithstanding the experimental demonstration that the seeds of few, if any, known species retain their vitality for more than 25 or 30 years at the outside, this story of the germination of "mummy wheat," and other seeds from mummy cases has appeared periodically in the public press. The recent repetition of this story has called for an interesting explanation in the July, 1921, issue of the *Quarterly Summary* of the Royal Botanic Society of London. The following quotation is from that article:

"In a newspaper a short while back there appeared a letter from a correspondent referring to some seeds of oats which had germinated after removal from a mummy 2,600 years old. As it is a good example of mummy stories, and this Society had something to do with the spreading of it, it may be interesting to Fellows.

"The particular mummy to which it refers was one presented to the late John (Rob Roy) Macgregor of canoe fame. When in the course of his wanderings (this was 50 years ago) he reached Egypt, the Khedive, Ismail, presented him with an unopened mummy in its case. After he came back to England it

was opened in the presence of credible witnesses, and among the dust at the bottom was found four oat seeds. Two of these he sowed himself, and two he brought to these gardens. All four seeds germinated, his producing flowers and fruits; our grew, but died without flowering. The story of their discovery and growth was put in the papers, and made a great stir at the time, while the fact that the Society had grown the seeds was held as proof of its authenticity.

the two halves to break, and through the interstices the oats filtered in. It had previously been noted as odd that only four seeds were found, and that these were of similar character to varieties then in cultivation."

"Not for a long time afterwards was any doubt cast upon the truth of it. Then a friend, who had lived many years in Egypt, told us that he very well remembered seeing the very coffins lying heaped up in the palace stables of the Khedive along with the fodder for the horses. It appeared that Ismail kept, as specimens of the most interesting product of his country, a store of mummies in their cases ready to present to distinguished visitors who came to see him.

"What doubtless happened was that the dry air of the stables, or the rough usage to which the mummy was subjected, caused the wood of the case to warp and split, or the clay luting joining

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PUBLICATIONS
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BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the *Annual Report* of the directors and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others one dollar a year; 25 cents a copy.

MEMOIRS. Established, July, 1918. Published irregularly. Volume I, *Dedication Papers:* comprising scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. Price $3.50, plus postage.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

12. *Endemism in the flora of the vicinity of New York.* 10 pages. 1916.

13. *The origin of new varieties of Nephrolepis by orthogenetic saltation. I. Progressive variations.* 28 pages, 6 plates. 1916.

14. *A white-cedar swamp at Merrick, Long Island, and its significance.* 10 pages, 5 plates. 1916.

15. *Present status of the problem of the effect of radium rays on plant life.* 8 pages. 1916.

16. *Flora of the vicinity of New York.* 6 pages, fig. 1. 1917.

17. *Endophyllum-like rusts of Porto Rico.* 9 pages, 3 plates. 1917.

18. *Inheritance of endosperm color in maize.* 11 pages. 1917.

19. *Studies of inheritance in Pisum. II. The present state of knowledge of heredity and variation in peas.* 102 pages. 1917.

20. *Inheritance studies in Pisum. III. The inheritance of height in peas.* 7 pages, fig. 1. 1918.

21. *A sketch of plant classification from Theophrastus to the present.* 16 pages. 1918.

22. *A basis for reconstructing botanical education.* 6 pages. 1919.

23. *Plant families: a plea for an international sequence.* 9 pages. 1920.

24. *Plants and animals of Mount Marcy, New York.* 69 pages, 1 plate, 22 figs. 1920.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

SEED LIST. Issued in December of each year.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in cooperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $6.00 a year.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $3.00 a year.